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IV - Semester

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E-COMMERCE

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SYLLABI-BOOK MAPPING TABLE

E-Commerce

Unit 8: E-Security: Security on the Internet; Network and Website Security Risks - Denial-of-Service Attacks, Viruses, Unauthorized Access to a Computer Network; Vulnerability of Internet Sites; Network and Website Security - Transaction Security and Data Protection, Security Audits and Penetration Testing; E-Business Risk Management Issues; Firewall - Network Policy, Advanced Authentication Mechanism, Packet Filtering, Application Gateways; Defining Enterprise Wide Security Framework.

BLOCK - III: E-PAYMENT SYSTEMS AND CRM, SCM

Unit 9: E-Payment Systems: Electronic Funds Transfer; Digital Token Based E-Payment Systems; Modern Payment Systems; Steps for Electronic Payment; Payment Security; Net Banking.

Unit 10: E-Customer Relationship Management: Customer Relationship Management (CRM) - Marketing Automation, Enterprise Customer Management; Customer Relationship Management Areas; CRM Processes; Architectural Components of a CRM Solution - Customer's Information Repository, Campaign Management, Event Triggers, Business Logic and Rules Repository, Decision Support Tools, Higher Level Statistical Analysis, Forecasting and Planning Tools, True Channel Management, Workflow Management, Collateral Management; Electronic Customer Relationship Management; Need, Architecture and Applications of Electronic CRM.

Unit 11: Supply Chain Management: Goals of SCM; Functions of SCM; Strategies of SCM; Electronic SCM and its Benefits; Components of Electronic SCM; Electronic Logistics and its Implementation.

BLOCK - IV: WIRELESS APPLICATIONS AND KNOWLEDGEMENT

Unit 12: Wireless Application Protocol: Architecture of WAP; Working of WAP; Wireless Technologies; Generations in Wireless Communications; Security Issues Related to Wireless Communications; Mobile Computing in Four Dimensions; Wireless Millennium.

Unit 13: Knowledge Management: Knowledge Management and its Goals; Collaborative Computing and Knowledge Management; Knowledge Management Tools; Features of Knowledge Management Tools; Knowledge Creating Process; Knowledge Management Strategies for Different Organizations; Knowledge Management in Research and Development Organizations.

Unit 14: Implementation of E-Commerce: WWW.EBAY.COM - B2C Website - Registration, Time Factor, Bidding Process, Growth of eBay; PayPal - New Trend in Making Payments Online; National Electronic Funds Transfer.

CONTENTS

INTRODUCTION

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E-commerce is the use of the Internet and the Web to conduct business transactions. It involves digitally enabled commercial transactions between organizations and individuals. The terms e-commerce and e-business are used interchangeably. E-business is the digital enablement of transactions and processes within a firm and therefore does not include any exchange in value. E-business turns into e-commerce when an exchange of value occurs across firm boundaries. Therefore, e-commerce and e-business intersect at the business firm boundary at the point where internal business systems link up with suppliers.

The study of E-Commerce includes diverse topics like its processes, goals, activities; the technical support through the Internet services, network models, protocols, data warehousing. It also involves an understanding of marketing, security, payments, CRM and SCM processes and much more.

This book, *E-Commerce,* is written with the distance learning student in mind. It is presented in a user-friendly format using a clear, lucid language. Each unit contains an Introduction and a list of Objectives to prepare the student for what to expect in the text. At the end of each unit are a Summary and a list of Key Words, to aid in recollection of concepts learnt. All units contain Self Assessment Questions and Exercises, and strategically placed Check Your Progress questions so the student can keep track of what has been discussed.

BLOCK - I
INTRODUCTION OF E-COMMERCE

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UNIT 1 OVERVIEW OF E-COMMERCE

Structure

1.0 INTRODUCTION

The term e-commerce refers to the amalgamation of tools built on information and communication technologies (by and large known as business software), in the organization, to enhance their performance. This builds value for the company, its customers and its affiliates. E-commerce spans much further than e-commerce or purchase and sale across the Web and delves into the procedures and background of a business venture.

E-commerce is a powerful business setting that is formed when one connects critical business systems directly with consumers, workforce, traders, and business associates using intranet, extranet, e-commerce technologies, two-way applications and the Web. It is more than a smart Web presence or a slick, flash-driven shopping cart. This is a critical surfacing of business across the world, with a number of technologies getting into the enterprise computing ecosystem. E-commerce

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provides a powerful mechanism for companies to enhance productivity and bring down costs. Nevertheless, in order to utilize these substantial benefits, organizations must make sure that their e-commerce is implemented appropriately and matches with their market segment. Ecommerce applications can be divided into three categories: (i) Internal business systems (ii) Enterprise communication and collaboration (iii) Electronic commerce. Today, e-commerce is a byword in the Indian society and it has become an essential part of our daily life.

1.1 OBJECTIVES

After going through this unit, you will be able to:

- Describe the activities and goals of e-commerce
- Explain the components of e-commerce
- Examine the various e-business models

1.2 DEFINITION OF E-COMMERCE

E-commerce is an advanced technology related to commerce and the electronic media, the computer in particular. It is first important to understand the term 'business', which refers to the exchange of goods, items or commodities and services or applications for money.

A popular definition of business is as follows:

Business is the exchange or the buying and selling of entities (goods or commodities) on a very large scale involving transportation from one place to another.

In e-commerce, there is a need for computers and Internet applications to manage and organize products and services. This concept of using the Internet to connect with customers, business partners and distributors for business purposes—as in the case of e-mail—is known as e-commerce or electronic business.

The terms 'e-commerce' and 'e-business' are often used interchangeably.

E-commerce deals with the buying and selling of information, products and services through the computer network.

E-commerce is defined as a business activity which uses an electronic medium. It also refers to the buying or selling of goods and services without visiting a store.

E-commerce involves activities, such as the delivery of information, products, services and payment through the electronic medium.

1.3 MAIN ACTIVITIES AND GOALS OF E-COMMERCE

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It is widely acknowledged today that new technologies, in particular, access to the Internet, tend to modify communication between the different players in the professional world, notably:

- Relationships of businesses and organizations with their clients
- Enterprise-employee relationships, that is, internal functioning
- Enterprise-partner relationships
- enterprise-suppliers relationship

The term '**e-commerce'** therefore refers to the integration, within the company, of tools based on information and communication technologies (generally referred to as **business software**) to improve their functioning in order to create value for not just the business, organization or enterprise but also its clients and partners.

E-commerce no longer only applies to virtual companies (called *click and mortar*) all of whose activities are based on the Net, but also to traditional companies (called *brick and mortar*).

In fact, the term e-commerce which is frequently mixed up with the term e-business, only covers one aspect of e-commerce, i.e. the use of an electronic support for the commercial relationship between a company and individuals.

All e-commerce projects are aimed at creating value. This value can be created in different ways:

- **By increasing margins**, i.e. by reducing production costs or increasing profits. E-commerce makes it possible to achieve this in a number of different ways:
  - o Focussing on new markets
  - o Positioning on new markets
  - o Increasing the quality of products or services
  - o Prospecting new clients
  - o Increasing customer loyalty
  - o Increasing the efficiency of internal functioning
- **By increasing staff motivation**. The transition from a traditional activity to an e-commerce activity ideally makes it possible to motivate associates to the extent that:
  - o By making the overall strategy more visible to the employees and favouring a common culture

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- o By encouraging the players to shoulder more responsibilities
- o By favouring teamwork and improving competencies

- **By improving customer satisfaction**. E-commerce favours customer satisfaction in the following ways:
  - o Reduced prices with increase in productivity
  - o Improved handling of clients
  - o Satisfaction of clients' needs in terms of products and services
  - o Transparent mode of functioning
- **As a result of privileged relationships with the partners**. The creation of communication channels with the suppliers permits:
  - o More familiarity
  - o Faster and better responsiveness
  - o Improved anticipation capacities
  - o Sharing of resources beneficial for both parties

An e-commerce project can therefore only work as soon as it adds value to the company, but also to its staff, its clients and partners.

E-commerce primarily ensures that costs are reduced, product cycle time is reduced, customer response is speeded up and service quality is improved. Therefore, it will not be wrong to say that the main goals of e-commerce are:

- To identify and fulfil the rapidly changing needs of consumers, merchants, organizations, etc.
- To constantly improve the quality of goods and services with the feedback from all stakeholders
- To increase the turnover by widening the market and the speed of services
- To bring down costs through speed and accuracy of information

All these goals can be achieved only if the website is user-friendly with a simple design. Visitors should be able to navigate through it properly. In addition, the business needs to be promoted well establishing a good connect with the customers.

It is important to understand what the company's e-commerce expectations are before plunging into implementing e-commerce solutions. Once the expectations are known, the company can begin to plan its e-commerce strategy. A company may benefit by conducting an e-commerce strategy project to plan its e-commerce future. E-commerce is a way to facilitate improvements in a company's internal and external processes, in addition to allowing a company to expand market penetration and geographical markets. Therefore, the processes that will be

integrated into the e-commerce infrastructure must be both known and ready for integration. To implement e-commerce without understanding the company's business goals or processes will result in failure of business.

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1.4 BENEFITS OF E-COMMERCE

Let us begin by discussing the benefit of e-commerce to organizations.

Advantages of E-Commerce to Organizations

The various advantages of e-commerce to business organizations are as follows:

- Users and firms can do their business online through wired or wireless devices and will be able to increase their sale by using e-commerce.
- Companies will be able to offer their products or services at lower prices.
- It increases the business both at the local and global level markets.
- The cost of manufacturing products, processing items, distributing goods, storing data or information and accessing information can be reduced.
- The business organization will be able to reduce paperwork.
- Drop-down processing permits customization of products and services which provides competitive advantage to its implementers.
- It decreases the time between the cost of funds; and between the products and services.
- It supports the efforts for Business Process Re-engineering **(**BPR**).**
- It decreases the product cost over the Internet, which is much more cheaper than Value Added Networks (VANs).
- It enables to build more collaborative and stronger relationships with suppliers. This includes streamlining and automating the underlying business processes, enabling areas, such as:
    - o Direct marketing selling
    - o Customer services (call centres)
    - o Fulfilment
    - o Procurement
    - o Replenishment and information management

Advantages of E-Commerce to Consumers

The following are the advantages of e-commerce to consumers:

- It allows customers to shop or perform any transaction at any time from any location in the world.
- It provides customers with better selection of products and services.

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- Consumers may make quick comparisons among expensive products.
- Consumers can interact with other customers, share their ideas, views and experiences.
- Significant discounts on different products or items are available due to high competition.
- It allows fast delivery of products and services.
- Consumers can get information in seconds.
- It is possible to participate in virtual auctions.
- Consumers can get additional information about the goods, and make a more informed decision. This helps in the following ways:
    - Better information opens the way to more assurances and to make a better choice.
    - Additional information also leads to improved consumer fulfilment because consumers have a better idea of using the goods.

Advantages of E-Commerce to Society

The following are the advantages of e-commerce to the society:

- It permits persons to work from home, due to which there is less traffic on roads and this in turn reduces air pollution.
- It helps products to be sold at competitive prices.
- It allows people in remote areas to connect through the Internet and enjoy products, goods and others services which are generally not easily available to them.
- Delivery of services at reduced cost.
- It improves the quality of products.
- More people can work offsite.
    - This decreases HR costs for companies, because they can have smaller office buildings, less parking spaces, fewer IT services, etc.
- It facilitates the delivery of goods with the help of postal services.
- High standard of living–Some goods can be sold at low prices, allowing less affluent people to buy more and increase their standard of living.

Check Your Progress

1. Define e-commerce.
2. What is email marketing?
3. List two advantages of e-commerce to society.

1.5 MAIN COMPONENTS OF E-COMMERCE

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The major components of e-commerce are as follows:

Customers

Customers could be varied in the market. With e-commerce which is an open platform to the whole world of customers, the same can then be divided into impulsive, patient and analytical. It can be noticed that the impulsive purchasers will be those who do not need or plan their purchase but might see an item on the website and get lured to buy it. For these sort of customers, it would be crucial to design a website which is attractive in the first go.

The second category of customers will be the patient ones. They will not buy on impulse. In fact it may be very difficult for a marketer to sell a product to them instantly. They will take their own time with no urgency for purchase.

The last set of customers are analytical. These would be the pragmatic category of customers whose main aim is to analyse what they are buying. These customers will value the product features and use against the price they are paying. Also they will analyse what other competitors are offering. They will use their cognitive component of behaviour to buy a product.

The online value proposition would be the customer value proposition which the website offers to the customers which is the USP of a company going online. This includes communicating what online experiences and content the brand will offer at each site, app and social presence.

Sellers and Products

The next component of e-commerce are the sellers and the product. Many a websites like e-bay are working on the interaction between these two components. Generally the sellers put up a website for the purchase of the product. This seller could be the seller of a product like garments to a service provider like a tourism agent. E-commerce is one platform where when a customer opens a website to purchase a product, the seller buyer interface gets complete. Websites like e-bay are an excellent example of bringing buyers and sellers of various product categories together.

Infrastructure

Every information technology system needs an infrastructure to work efficiently. For the same, the company has to develop a system dynamics model of email marketing .This can be divided into five steps. First would be to define the boundaries of the system by drawing on observation, research etc. The email marketing system will entail in it the senders of email, receivers of email, and technology vendors who will sell products for automation of the decision problem faced by receivers of email.

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The next step would be to define the key variables of the system, that has volumes of various types of messages sent, the revenue paid to sponsors of messages, the processing capacity of the receiver, and filter quality. The next in the infrastructure would be the reference modes of the system which get explicated, and explain how the individuals and organizations think and react within the system in the long run. The fourth step before one builds a model or infrastructure would be to study the relationships among variables in causal diagrams that also include the causal links and feedback loops. After this a simulation model is developed and validated in the fifth step, with major policy recommendations which rely on the dynamic behaviour of the system.

Intermediaries

Intermediary is a third party that operates between sellers and buyers. For an order to reach the consumers once listed on the website and paid for one needs a courier or logistics company. For example, when the same website seventymm.com is to deliver a garment to the consumer, it uses third party couriers like DHL.

1.6 FUNCTIONS OF E-COMMERCE

E-commerce applications enable various business functions and transactions to be done electronically. Some of the functions are discussed as follows:

- **E-Advertising:** Advertising of information is currently the largest commercial activity on the Web. For example:
  - (i) A company's website contains its profile and all the information on its products and services.
  - (ii) It displays banners that can be clicked.
  - (iii) E-commerce portals like www.yahoo.com.
  - (iv) Newsgroups also provide publicity.
- **E-Catalogues:** Web pages that offer information on products or services that a company offers are available on an e-catalogue. An e-catalogue provides information on:
  - (i) Packaging
  - (ii) Product attributes and characteristics
  - (iii) Availability
  - (iv) Payment modes
  - (v) Cost, etc.
- **E-Publishing:** This sector was among the first few to spend on this novel technology especially on the Internet. E-publishing has led to several successful e-commerce endeavours, such as an independent publication through the Internet and electronic newspapers.

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Online publications offer services, such as:

(i) Online reading/browsing
(ii) Online search
(iii) Customized information services

- **E-Banking:** This facility offers remote banking electronically. Electronic banking is also referred to as online banking, cyber banking, home banking or virtual banking. It enables Web users to make online purchases and pay for the same using an online-banking facility. It is cost-effective, simple and available 24 hours. Customers have access to several services, such as:

  (i) Bill payment
  (ii) Electronic cheque writing
  (iii) Record keeping
  (iv) Tracking of bank account, credit cards

Shopping Services

Shopping services are of many types. A few of them are discussed as follows:

1. Services provided by independent businesses who send their representatives to the stores to do comparison shopping for specific products. A shopping service is hired on contract to compare competitive prices or prices for the same item in competitive stores, depending on the request, and the needs of the client.
2. Shopping services that are offered to cable television subscribers where consumers can buy products (usually at a discount) that are displayed on a special shopping services channel.
3. Shopping services are offered to subscribers of personal information services for home computer use. For example, a company provides online information to subscribers. Among the many services offered by this company is one called products guides, from which consumers can shop and select purchases right from their own computer terminals.

Information Services

Information service is also known as information systems. For several organizations, information systems or information services are accountable for IT and Management Information Systems. Different types of decisions are supported by information systems at various levels of the organizational hierarchy. Key information systems include information management software and structural databases. They include the following:

- Enterprise Collaboration System (ECS)
- Transaction Process System (TPS)

- Decision Support System (DSS)
- Executive Support System (ESS)
- Management Information System (MIS)

1.7 COMMUNICATION, PROCESS MANAGEMENT, SERVICE MANAGEMENT AND TRANSACTION CAPABILITIES

E-commerce performs the following functions:

- **Communication:** This function aims at delivering information for business. This could include e-mails which are a very crucial part of communication when it comes to business to business delivery of messages.
- **Process Management:** This includes automation and improvement of business process. This could include the network of computers and sharing data among themselves.
- **Service Management:** This includes the use of technology to improve the quality of service. For example, some of the courier websites help to track the courier shipment and the time at which it will reach the customers.
- **Transaction Capabilities:** This includes the service of buying and selling on the internet. Some of the major websites which do this are Amazon and e-bay. These website become a portal or a market place for customers and sellers.

1.8 TYPES AND PROCESS E-COMMERCE

Electronic commerce (e-commerce) or business is the use of the Internet to transact businesses. This transaction of business is done between one organization and another; between individuals; between government and businesses, and so on. Lately, e-commerce has gained importance as there is more and more usage of the electronic medium. There are mainly five models to conduct e-commerce, which are (i) Business to Business, (ii) Business to Consumer, (iii) Consumer to Consumer, (iv) Peer-to-Peer and (v) Mobile Commerce. These models are discussed in the following sections:

(i) Business to Business (B2B)

In this form of business, buyers and sellers are both business entities. It is the most popular form of e-commerce transacting crores of rupees. However, it does not involve individual customers. It happens when a manufacturer

supplies goods to a retailer or a wholesaler, e.g., Dell sells computers and related accessories online, however, it does not produce all the products.

(ii) Business to Consumer (B2C)

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This is the most common form of e-commerce that involves companies selling directly to individual consumers. In the beginning, its performance was sluggish but after the late 1990s, its growth became high.

The primary idea behind B2C is that marketers and retailers can sell their merchandise to consumers online. This is done through data that is made available via many online marketing tools, e.g., an online pharmacy giving free medical consultation and selling medicines to patients.

However, there are two basic problems faced by B2C e-commerce, which is how to: (i) Increase volume and (ii) Sustain customer loyalty. As the B2C model is of winner-take-all nature, many smaller firms find it difficult to enter a market or remain competitive. At the same time, online consumers are very sensitive about price and can be easily lured away by others. So attracting and keeping new customers is difficult.

(iii) Consumer to Consumer (C2C)

This model of e-commerce helps to transact businesses between two people. This is possible with the help of an intermediary, such as eBay, which provides a platform to help consumers to transact the business. Without the help of an intermediary, it would be difficult to conduct this type of business.

(iv) Peer-to-Peer (P2P)

This e-commerce model not only helps to do business; it is also a technology which helps people to share their computer files and resources and that too without the help of a central Web server. However, both sides need to install the required software to facilitate communication on the common platform. However, P2P does not generate much revenue.

(v) Mobile Commerce (M-Commerce)

M-commerce is the commerce transacted with the help of mobile phones. This is the latest entrant in e-commerce. Mobile phones owners can contact each other and conduct business, through direct contract, SMS and GPRS facilities. Companies doing business through the GPRS try to optimize Websites to be viewed properly on mobile devices.

Apart from these models, there are other models of e-commerce, such as Government to Business (G2B), Government to Citizen (G2C) and Business to Employee (B2E). These models are a general categorization and they need not be followed thoroughly while doing a business. It may happen that a business might follow one model or a part of other models, which might suit it.

1.9 ROLE OF INTERNET AND WEB IN E-COMMERCE: TECHNOLOGIES USED

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Recently, there has been movement towards web marketing, which attempts to provide the organizations with flexible, effective and efficient means of getting access to the organization's most critical and valuable assets. Web marketing has implications for improved information dissemination and decision making by allowing users to distil the most important pieces of data from disparate legacy applications, without the time, expense, and risk to data. The most pivotal factor in web marketing is its architecture, which suggests the need to allow scope and leverage for new and enhanced software technology so that the results of the consumer queries are inferred appropriately.

A website would be a representation of the overall structure of data, communication, processing and presentation existing for the end-user of the business. A web marketing approach provides the end users the flexibility as well. This technology gives the users the products in a unified, along with a global view in their respective distribution systems. Using the latest technology, web-based applications can be built to be accommodated on top of the existing corporate infrastructure and provide value to the customers accessing the website information.

Web marketing provides an effective way to give access to the right information to the right people, all as directly and easily as possible. Web marketing is a process of getting to the website directly by the end users, which in turn aids decision makers. It is the technological technique of getting to the company platform directly by the end users.

Technologies Used and E-Commerce Systems

Some of the technologies which are needed for the efficient use of e-commerce by companies has been listed below:

Telecommunication Infrastructure Requirements

One of the most important technologies needed in e-commerce is bandwidth and security. Bandwidth is majorly crucial for B2B e-commerce and a product-based model for high-traffic B2C e-commerce than for low-traffic one. The major need of the same would be firewall and encryption/algorithm mechanism.

Hardware Requirements for E-commerce

Hardware requirements which are needed for high-traffic sites will depend on the number of transactions per second; number of queries per second; number of pages served per second involving all of the above parameters. Where the low-traffic sites could be served from a single machine there would be a need of Pentium II/III based Intel server running Linux for sites serving many customers and unique customers every day.

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Software Requirements for E-commerce

Software requirements for e-commerce include Apache Web Server, Apache-Jserv Servlet Engine, Linux Operating System, mySQL database, postgresql etc. Some of the open source software could be available but the same might not be appropriate for the high-traffic sites.

Technical Skill Requirements

There has to be a systems administrator who has a good knowledge of computer hardware. This could also upgrade hardware which includes the hard drive, processor and motherboard. They should also be able to work on Apache, mySQL and Java servlet engine. Some experts in the field of programming for languages like C, PHP and Java will also be needed to form an architecture of the website.

Financial Infrastructure

Payment procedures are crucial in e-commerce. For the same, the site should have a dependable telecommunication network, integrated banking software, WAN and Internet, electronic fund transfer system, electronic clearing system, public key based encryption system, credit card system, foreign exchange remittance, legal infrastructure etc.

1.10 PRE-REQUISITES OF E-COMMERCE

The following are the requirements of e-commerce:

- Improved customer service
- Origin of new business opportunities
- Enhanced speed and accuracy of a product
- Product cost saving

- **Improved customer services:** These days, consumers want better service. Therefore, e-commerce services offer a means of communication between the consumer and the company. The consumer can even make online complaints to a company. Most websites provide a different e-mail id where complaints can be mailed. Customer-oriented organizations take complaints very seriously. Not only are the grievances given a good hearing. Action is taken almost immediately. It is possible for satisfied as well as dissatisfied customers to express their opinions and also make suggestions. The bonding between the company and the customer strengthens.
- **Origin of new business opportunity:** Bigger network between consumers and companies can lead to new business opportunities. For example, a business may find infinite possibilities to develop and increase its consumer base. A company offering gardening-related products may also think of venturing into delivery of bouquets, cakes and gifts on request, for a price.

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Companies offering toys for toddlers could also come up with a forum where parents can interact with paediatricians or child psychologists to clarify doubts.

- **Enhanced speed and accuracy of a product:** The usage of e-commerce services reduces human errors and other problems like a duplication of proceedings. This perfection in speed and accuracy, plus easy access to documents and information affect the increase in production. A customer care executive may often forget to enter necessary details of a transaction. She may have to call up and bother the customer repeatedly to get some information. In case of online interaction, the customer will fill in his own details. Reconfirmation may not be necessary at all. Wastage of time and money can be checked.
- **Product cost saving:** Despite the fact that you can reduce the cost of a product by the use of e-commerce services, it also reduces the errors and the cost of sending the information to partners.

Prerequisites of E-Commerce Procedure

More and more people are getting into e-commerce. This is natural because there are hardly any barriers to entry. Online businesses can be run from home. You do not really need degrees and certificates to get started. However, you do need to give the venture some serious thought. A lot of work would be required, at least initially.

In order to conduct e-commerce, the main things you will require include the following:

1. A commercial website like www.futurebazaar.com
2. A product or service you want to sell through the respective websites
3. Shopping carts or purchase order forms
4. Current credit card account that will be accepted on e-payment
5. An online payment gateway, if you plan to process credit cards in real time, over the Internet
6. A secure socket layer (SSL) to secure the gateway

1.10.1 Scope of E-commerce

Prior to the time of the Industrial Revolution, virtually all trade and exchange processes involved some personal contact between suppliers and their customers. This meant that individual producers could cater to the needs of their customers, and most trade was very local in nature. The increase in overseas trading and the advent of the industrial revolution heralded the start of new types of trading practice, and the introduction of some of the processes like web based marketing which are part of marketing today.

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Initially, producers and manufacturers were concerned mainly with logistical issues - transporting and selling goods to widespread markets, often located far away from the point of production. The focus here was on production, with consumption and consumers being seen as the end result of a production and distribution chain. For as long as demand outstripped supply, which was generally the case as western countries started to go through periods of dramatic growth in economic activity and technological change, producers could all exist profitably simply by producing more efficiently and cutting costs. Little attention was given to the role of the consumer in exchange processes.

In the early twentieth century the realization that marketing was, in itself, an important part of the business process led to the founding of the American Marketing Association and the development of the earliest aspects of theory and practice. It was much later, however, that the need for a web based marketing was recognized, with a clear focus on the needs of the consumer.

E-commerce provided the consumers with an arena of benefits. It provides an easy reach to the customers for the needed product. A company could portray their product, sell it, answer queries through live chats and also collect feedback form their website. This threatened the traditional way of doing business. Today there isn't any company which does not have a web presence.

1.11 E-BUSINESS MODELS

The e-business life cycle starts from the moment a customer buys a product on a Website to the moment the product is actually delivered to the customer. The following are the three major e-commerce applications used in the e-business life cycle:

(i) Business to Consumer (B2C), through the Internet.

(ii) Business to Business (B2B), through the Internet.

(iii) Business within business, through intranet.

The use of the seller's Website by customers is the central focus of attention of e-commerce application. Consumers can order online from any place and at any time. This approach is the representation of the conventional shopping experience in stores. A shopping cart, for example, is used to hold items or goods until the customer is ready to sign out. Checkout is order and payment processing. B2C is similar to conventional mail order or telephone-based ordering system.

Portal

A **portal** contains and presents information in a systematic manner which it receives from different sources. It also offers search engine feature and services, such as e-mail, news, information and entertainment. Portals provide a way through which organizations maintain a consistent look and feel with access control and various

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methods for several applications. Web portal examples are Yahoo, AOL, iGoogle etc. The different types of portals are discussed in the following sections:

(i) Horizontal vs Vertical Portal

There are two main categories of portals: (i) Horizontal portals and (ii) Vertical portals. Horizontal portals cover many areas and vertical portals focus on only one functional area. The hoizontal portal is used as a platform to many organizations in similar economic sectors or to the same types of distributors or manufacturers. Thus, a vertical portal is a special entry point to a special industry or market niche, subject area or interest. It is also known as **vortal**.

Fundamentally, a portal is an extremely comprehensive Website which provides information and services about a specific topic. There are two types of portals, horizontal and vertical. The portals are called 'horizontal' because they list the Websites that cover a broad range of topics. Vertical portals on the other hand are narrow, covering only one topic or one type of topic.

Initially portals provide plenty of general information to a wide audience and was termed as 'Horizontal' portals, for example Yahoo providing Web searching, news, free e-mail, discussion groups, online shopping and links to other Websites. Nowadays, 'Vertical' portals are emerging which provide focused information on specific industries/interests, such as banking, computers, publishing, etc. In order to find a vertical portal the user can select a search engine, such as Google and then type a subject of his/her choice, for example 'car portal'. Several car portals will come up. Each one of them contains a list of car sales Websites to opt from. Additionally, the list is far more efficient than just searching for 'cars'. Similarly, the different portals can be searched as per the requirement. Vertical portals might be the only technique to find the preferred retailer to buy from.

(ii) Personal Portals

A personal portal gives personalized capabilities to its visitors by providing a pathway to other content. It is made to use distrubuted applications, various types and numbers of hardware and middleware; to provide services from a number of different sources. Personal portals help in social networking or giving links to other contents that might help others beyond its services reach.

Typically a personal portal is a site on the World Wide Web or WWW that provides personalized capabilities to its visitors. Additionally, personal portals are dependent on business portals that are specifically designed to share resources and collaboration in workplaces. It further requires a business-driven approach such that the content is adequate to work on multiple platforms, such as personal computers, personal digital assistants and cell phones/mobile phones. The content here specifies the information, news

and updates that would be delivered through such a portal. Personal portals can be related to any specific topic, such as providing friend information on a social network or providing links to outside content that may help others beyond your reach of services. Portals are not limited to simply providing links. Information or content that is placed on the Web may create a portal in the sense of a path to new knowledge and capabilities.

(iii) Regional Web Portals

Regional Web portals provide information, such as local business data, street maps, weather forecasts and other information that is useful for the regional area. They have moved into areas, unthinkable a few years earlier. These 'local content – global reach' portals have developed in all countries, such as India, China, Vietman, Italy, Greece.

(iv) Government Web Portals

These days, almost all governments have created portals for their citizens, for example, the main portal of the Government of India is (India.gov.in), the US government has (USA.gov) in English and (GobiernoUSA.gov) in Spanish, the UK government (Gov.UK) has (Directgov) for citizens and (businesslink.gov.uk) for businesses. The European Union has its own Web portal, which links all EU agencies and institutions.

(v) Corporate Web Portals

During the 1990s, corporate intranets became popular, but as it became complex and its size grew, Webmasters (those who manage Websites) had to tackle the increased content and user management challenges. Users demanded personalized and customized view of company information. Efficient Webmasters offered some solutions but many users were not satisfied. Therefore, many companies began to offer tools to Webmasters to manage their applications, data and information. Collaboration between work groups, workflow management and policy-managed content publication are some of the portal solutions. Most portals permit external and internal access to specific corporate information with the help of secure authentication or single sign-on. Corporate portals also give customers and employees the opportunities of self-services. The coming few years will be significant because the idea of content aggregation is becoming popular. It is going to get a push and portal solution will continue in the next few years. Studies by Gartner, an information technology research firm, indicate that the Generation 8 portals will grow the idea of delivering a wide range of tools applications, information and access points through a single window or mechanism.

(vi) Hosted Web Portals

With corporate portals gaining popularity, many organizations have offered to provide hosted services. The market for hosted services have significantly changed the composition of the portals. Actually, these portals were simply

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a tool for publishing information instead of integrating legacy applications or presenting correlated data from distributed databases. Hosted portals automatically personalize the content generated from their modules to provide a personalized experience to their users.

The hosted portal market necessarily altered the composition of portals. At times they serve simply as a tool for publishing information as an alternative of the loftier goals of integrating legacy applications or presenting correlated data from distributed databases. Since hosted Web portals have grown in popularity hence their feature set has also grown to include hosted databases, document management, e-mail, discussion forums, and so on. Emerging new category of Internet portals called Cloud Portals are showcasing the power of API (Application Programming Interface) rich software systems leveraging SOA (Service Oriented Architecture), Web services and custom data exchange to accommodate machine to machine interaction that creates an additional liquefied user experience to connect users spanning multiple domains throughout a specified 'session'. Leading cloud portals, such as Nubifer Cloud Portal platform uses Enterprise Mashup and Web Service integration approaches to build cloud portals.

(vii) Domain-Specific Portals

Many domain-specific portals have come up, which are specific to that particular domain. These portals provide access to related companies and services, such as property portals. The property specific portals give access to services, such as estate agents, house/office movers, and so on. There are even industy-specific news and information portals.

A number of portals have come about that are specific to the particular domain, offering access to related companies and services, a prime example of this trend would be the growth in property portals that give access to services, such as estate agents, removal firm and solicitors that offer conveyancing. Along the same lines, industry-specific news and information portals have appeared, such as the clinical trials specific portal: IFPMA Clinical Trials Portal.

(viii) Sports Portals

Many Web portals have diversified into the professional sports market. Supporters of sport teams gather all information about a professional team or sport and create sport portals.

Nowadays, sports Website is quite popular and different clubs and sports organization are using it to promote their games and sports events. Sports Website design should be inspiring, informative and should be able to capture the imagination of the fan as well as of the general people.

On the Internet, for example one can look for a football club fan site or an online shop from which the retailer can sell or buy golf clubs items as per

the need. The examples of portals include Sports Portals, Sporting Organizations, Sports Clubs, Soccer Websites, Cricket Websites, Golf Course Web Portals, Tennis Websites, Marathon Websites and many more.

Electronic Retailer (E-Tailer)

An **e-tailer** is a person who mainly enables customers to shop for items or other services through the Internet.

Types of E-Tailers

The two major categories of e-tailers are as follows:

(i) Pure Plays (ii) Bricks and Clicks

(i) A **pure play** e-tailer functions by retailing items or goods with the help of the Internet. Examples of pure play e-tailers are various Websites.

A **pure play** is referred as an organization which originates and conducts their business purely through the Internet. They do not have physical stores from where the customers can shop. Amazon.com who was initially involved in retail products and Netflix.com are some of the examples of large pure play companies. The Internet with a much lower barrier to smaller companies allows them to compete with the larger brands. There are many opportunities of growth for pure play merchants.

(ii) A **brick and click** e-tailer uses the Internet facilities to sell his products or services. He also provides the conventional physical products which are obtainable to users.

In bricks and clicks type of business model a company amalgamates offline (bricks) as well as online (clicks). Sometimes it also provides ordering of services or products over telephone as well with telephone sales support. When a certain chain of stores allows the customer to order products either online or physically in one of their stores, also allowing them to either pick-up their order directly at a local branch of the store or get it delivered to their home is a popular example of this type of model. There are many alternative combinations of this model.

Advantages of E-Tailing

E-tailers have the chance to provide greater profit margins to those who participate in the pure play type business. Pure play allows the retailer to reach to consumers throughout the globe by keeping one site for each and every consumer to traverse at any time.

Disadvantages of E-Tailing

E-tailers do not fulfil the requirements of online customers, and if they want their customers to return to them, then they normally require to give a good impression. Search, support and promotion are the three most essential things that e-tailers work nowadays in order to make sure gain.

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Content Provider

Content providers store and access data and make it available to all applications. However, there is no common area of storage that all the users can access.

If you want to make your data public, then you have two choices:

1. You can create your own content provider.
2. You can also add the data to a content provider, if the same type of data is controlled and you have written permission to it.

The Data Model

Content providers define their data on a database model in the form of a simple table, where each row indicates record and each column represents data of a specific type and meaning, for example, customers' information and their phone numbers can be given as follows:

ID	NUMBER	LABEL	NAME	TYPE
1	100	AB apartment	Ajay	TYPE_HOME
2	200	Delhi office	Raj	TYPE_MOBILE
3	300	Ashirwad	Kapil	TYPE_HOME

A numeric_ID field is required to uniquely identify the record within the table for every record. IDs are also used to match records in related tables, for example, to find a person's address in one table and the name of that person in another table.

A query returns a cursor object that can move from one record to another and one column to another, and also read the contents of each record. For reading each type of data it defines the methods. You must know what type of data the field contains to read a record.

Transaction Broker

The transaction broker—a middleware application—facilitates the flow of information from third-party application into access dimensions. It is a very good solution for businesses that seek to gather information on to a consolidated database or need a low-cost and maintenance approach for the whole company. Integration of data with the help of transaction broker is very extensive.

Making Integration Simple

A transaction broker provides a low-cost solution to seamless integration. This type of integration does not need to customize programming or user intervention.

If transactions are produced through any office application, then it can be automatically updated. This can be done in real time to access accounts. As data is collected in one database through extensive integration facilities, it could be collected at no time on to comprehensive management reports.

Adapting to Your Business Systems

The biggest strength of transaction broker is its flexibility. It may be programmed to read broker transactional data from a large range of business applications. This may include—Websites, EPOS systems; ODBC complaint database; and applications specific to one's vertical market. The automated transfer of information has a great potential for savings, which can be obtained from it.

Faultless Data Transfer

In a transaction broker, data transfer is faultless, as there are many high quality safeguards built into it. Thus, it gives you complete confidence in the brokering routine. Before updating the accounts, it is necessary to maintain data integrity and generate a complete audit trail, so that every transaction gets complete validation. And to see that the process of integration is not undergone more than once, all brokered transactions are flagged down.

Reducing your E-Business Costs

Accounts system integration and the cost of e-commerce Website is drastically reduced by a transaction broker. The requirement for a regionally hosted Website and expensive telephone lines by trading Web orders straight into the order processing system is removed. Regardless of whether your business is big or small, this solution helps your trade to increase its profit on the Internet. The point of sale system has changed the way in which the information of retail sales is recorded. The other step is to broker this transactional data into accounts package. This integration does away with the requirement for re-keying of data and manual adjustments of the stock. Integration with EPOS solutions is also easy.

The main role of a transaction broker is to help both the purchaser and the vendor with the required official procedure, and rules and regulations involved in transferring possession of real property. A transaction broker is not a representative or agent for either the purchaser or the vendor.

Market Creator

A market creator plays an important role in any transaction over the Internet. It surveys the market properly before any transaction occurs between the company and its consumers. Market creators are actually responsible for creating the market for successful transactions between the seller and the buyer.

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Service Provider

A **service provider** is an entity that offers services to other entities. Usually, this refers to a business that offers subscription or Web service to other persons or businesses, for example, Web application hosting, providing Internet access and mobile phone operator.

Applications in B2C

The followings are the applications in Business to Consumers or B2C:

E-Banking

E-banking is a way through which users can do their transactions electronically or online over the Internet. In spite of traditional banking, e-commerce plays an important role nowadays.The following services can be availed through e-banking:

(a) Payment of Bills
(b) Fund Transfer
(c) Credit Cards
(d) Railway Pass
(e) Investment through Internet Banking
(f) Recharging Prepaid Phone
(g) Shopping

- **E-Trading**

Electronically trading in stocks, securities and funds is called e-trading. It needs an extensive communication network and infrastructure to clear transactions. However, the saving over the conventional stock brokers is substantial.

- **E-Auction**

In trading valuable goods, such as a painting or other such merchandise, where the price of the goods cannot be easily determined, the process of auction is adopted. Its objective is to select a fair price for the goods by choosing buyers who need them the most. These auctions are also called forward auctions. In this type of auctions, the purchasers complete with each other by bidding for the goods to be sold.

Business to Business (B2B) Models

Different models have been developed for B2B e-commerce, which is based on the control of market, buyer, supplier, etc.

E-Distributor

E-distributors are organizations that supply products and services directly to individual business firms. Generally, e-distributors are owned by one company that tries to serve many customers, e.g., grainger.com.

B2B Service Provider

B2B service provider is concerned with industrial marketing; among the processes it handles are fulfilment and procurement. When you make an online purchase and payment is allowed through a credit card clearance, a message is generally displayed saying, 'Thank you for your order'. The amount is transferred from your account. The moment the message is displayed on the customer's monitor, an electronic order is sent to the vendor to fill the order and ship or transport it directly to the customer. Performing this electronically means reduced inventory and quick service. The intranet plays an important function as a corporate and product information centre and is strictly a 'within company' type of information exchange. This interlinked environment is restricted to internal employees and customers, with firewalls to keep out non-employees. E-mail replaces paper for communication of messages, order acknowledge and approvals, and other forms of correspondence within the organization.

In intranet, there is no true payment process. Transfers of funds or charges against budget accounts are purely an accounting transaction as part of the intra-company billing procedure. Thus, intranet becomes a facilitator for the exchange of information and services among the departments or divisions of a large company.

Benefits of B2B

Some of the benefits of B2B are that you can outsource the unprofitable parts of your business; quicken your product development activities; or reduce time to the market; improve business and market intelligence; understand your market better than your competitors; clone your business in future markets; improve the speed of communication; facilitate communication between your customers and suppliers; reduce wastage through additional sales channels; improved ability to experiment and learn; higher customer retention rates; lower customer acquisition costs; and reduced costs can be passed on in favourable pricing. Besides these, B2B also provides exclusive benefits, such as fewer human interventions, less overhead expenses, fewer inadvertent errors, more efficiency, more advertising exposure, new markets and new physical territories equated to an intelligent method of mutual business. It is a win-win situation for both the buyer and the seller.

These are just few of the advantages of B2B e-commerce. It has been proved beyond doubt that doing business on the Internet is profitable. The actual return on the initial investment is very good. There is bound to be more profits for the business.

Just In Time Delivery

Just In Time (JIT) delivery is very important from customers' viewpoint. This phase of B2B is critical because customers want delivery of good, items and products are delivered just when they are required. It means savings in terms of time and money.

Consumer to Consumer Model

Consumer to Consumer (C2C) involves the electronically-facilitated transactions between consumers with the help of a third party. Online auction is a common example, in which a consumer posts an item for sale and other consumers propose to buy it; the third party generally charges a commission or flat fee. The sites are only intermediaries, just there to match consumers. They do not have to check the quality of the products being offered, for example, eBay, Craigslist, Amazon.com, etc.

This type of e-commerce is expected to increase in the future, because it cuts out the costs of using another company. It could change in the sense that some one can send an advertisement regarding a sale to your Global Positioning System (GPS).

Universities

Consumer to consumer models are becoming popular among students in universities, because these are large organizations in the same environmental area which are low on cost. So they look for deals very often and these kinds of Websites offer them. Universities themselves identify spaces for the students to sell books and other items to various students; users can also advertise that they are subletting their apartment. An example of this is Tiger Books and Dalhousie University classifieds, both of which are put together by the Dalhousie Student Union (DSU) for the students.

Peer-to-Peer Model

Many attempts have been made by different companies to utilize the P2P architecture for making money. However, to date, the only successful business model is based on benevolent users, donating their CPU resources for scientific work, although some content sharing software client developers do provide functionality enhancements based on a fee as well as display third-party advertisements in the client console in order to finance the client programming projects. A P2P model for mega-scale business is yet to be developed. The main obstacles in P2P model are of security and rating.

There is a lack of responsibility inherent in the privacy and anonymity of P2P environment. A lack of a central authority makes it difficult to enforce contracts. In addition, there is no true P2P payment mechanism so far which facilitates

exchanges without depending on some sort of intermediate authority and without affecting the privacy.

An individual rating system can help to solve the trust and contract enforcement problem, while an electronic payment mechanism (incorporating a card reader and e-cash) is designed to resolve the issue of payment. In addition, some variant of escrow may be applied to P2P architecture in order to ensure smoothness of transactions.

Check Your Progress

4. Who are intermediaries in e-commerce?
5. What is the largest commercial activity on the web?
6. What is a portal?

1.12 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. E-commerce is defined as a business activity which uses an electronic medium.
2. Email marketing can be said to be the marketing of a commercial message to a group of people who are using the electronic mail
3. Two advantages of e-commerce to society are as follows:
   - It helps products to be sold at competitive prices.
   - It improves the quality of products.
4. An intermediary is a third party that operates between sellers and buyers. For an order to reach the consumers once listed on the website and paid for one needs a courier or logistics company.
5. Advertising of information is currently the largest commercial activity on the Web.
6. A portal contains and presents information in a systematic manner which it receives from different sources.

1.13 SUMMARY

- E-commerce deals with the buying and selling of information, products and services through the computer network.
- E-commerce helps in building sustainable competitive advantages and differentiates the product from the competition along attributes that are important and relevant to customers.

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- Social networking could be a good tool for the company to spread the word about new products. With the upsurge of so many social network sites like Facebook and LinkedIn, the process of communicating and targeting a particular group of customers has become even easier.
- E-commerce is a way to facilitate improvements in a company's internal and external processes, in addition to allowing a company to expand market penetration and geographical markets.
- Users and firms can do their business online through wired or wireless devices and will be able to increase their sale by using e-commerce.
- E-commerce allows people in remote areas to connect through the Internet and enjoy products, goods and others services which are generally not easily available to them.
- Process management includes automation and improvement of business process. This could include the network of computers and sharing data among themselves.
- There are mainly five models to conduct e-commerce, which are (i) Business to Business, (ii) Business to Consumer, (iii) Consumer to Consumer, (iv) Peer-to-Peer and (v) Mobile Commerce.
- The following are the three major e-commerce applications used in the e-business life cycle:
  (i) Business to Consumer (B2C), through the Internet.
  (ii) Business to Business (B2B), through the Internet.
  (iii) Business within business, through intranet.

1.14 KEY WORDS

- **Turnover:** It means the amount of money taken by a business in a particular period.
- **E-Banking:** It is a method of banking in which the customer conducts transactions electronically via the Internet.
- **Peer-to-Peer:** It relates to networks in which each computer can act as a server for the others, allowing shared access to files and peripherals without the need for a central server.
- **E-Tailer:** It refers to a person who mainly enables customers to shop for items or other services through the Internet.

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1.15 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short-Answer Questions

1. What is the scope of e-commerce?
2. List the benefits of e-commerce to consumers.
3. Write a short-note on the activities of e-commerce.

Long-Answer Questions

1. Describe the functions of e-commerce.
2. Examine the various e-commerce models.
3. Describe the pre-requisites of e-commerce.

1.16 FURTHER READINGS

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UNIT 2 E-COMMERCE ACTIVITIES

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Structure

2.0 INTRODUCTION

In the previous unit, you were introduced to various concepts related to e-commerce. You learnt that e-commerce is essentially the activity of buying or selling of products on online services or over the Internet. The unit also discussed the goals, functions, scope, types and models of e-commerce. In this unit, we will examine the activities of e-commerce.

2.1 OBJECTIVES

After going through this unit, you will be able to:

- Discuss the various activities of e-commerce
- Describe the types of e-commerce providers and vendors
- Explain the steps to design and develop e-commerce website

2.2 VARIOUS ACTIVITIES OF E-COMMERCE

The following are the major activities of e-commerce:

Online Shopping

Online shopping is one of the major e-commerce activities. It entails shopping of through the Internet. Virtual stores can be created and a variety of choices are

available on the net for a company's merchandise which could be more that what is available at their physical stores. Thus, the investment for online shopping is less. One of the major problems in the online shopping model is for the company to generate traffic on the website.

Electronic Payments

The payment systems which includes utility bills and payments made for online shopping is an important aspect of e-commerce. Here what is most important is the security needs which have to be ensured for credit card and personal information.

Virtual Auctions

The virtual auction is a system followed by popular websites like eBay. These websites offer customers the benefit of selling to others at the best possible price. The new sites in this domain in India are OLX where one can sell their old product and the buyers could meet them virtually at the website.

Internet Banking

E-commerce has helped shorten physical visits to banks as regular banking activities could be done online with the help of secure banking services. Here again the security and privacy of the customer is very crucial.

Online Ticketing

Today all types of ticketing can be done online. The same include travel ticketing like air travel, bus and trains, and entertainment and sports events. Thus, there is no need of pre-booking an event only after one goes to the point physically. Booking can be done at home and one could straightaway go the event on the day of the event.

2.2.1 Various Modes of Operation Associated with E-Commerce

This has been discussed in the previous unit. The various modes of operations associated with e-commerce have been explained as follows:

- Business-to-business (B2B)
- Business-to-consumer (B2C)
- Consumer-to-consumer (C2C)
- Consumer-to-business (C2B)

2.2.2 Matrix of E-Commerce Types

The matrix of types of e-commerce shows the various operations which could be conducted through e-commerce. These could be B2B, B2C, C2C, C2B as explained above. These transaction could also be G2B which means government to business. Most of these transactions include the tax and fee collection where a collection of tax can be done by the government from a business house.

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Also there are operations which are G2C where the tax can be collected by the government through its online websites from the customers directly. There is also a G2G model where two government agencies can communicate or transact with each other for the purpose of budget allocation to an administrative activity.

	Business	Consumer	Government
Business	**B2B** Supply Cain, Wholesalers	**B2C** Retailers (Goods or Services)	**B2G** Contract bidding, Privatization
Consumer	**C2B** Public Bidding marketplaces, Auctioneers	**C2C** Public flea markets	**C2G** Public Government auctions
Government	G2B Tax and fee collection	**G2C** Tax and fees collection	**G2G** Budget allocation

Fig. 2.1 E-Commerce Matrix

2.2.3 Elements and Resources Impacting E-Commerce and Changes

There are many elements which impact the e-commerce arena. One of them is the trust of the consumer. Johnson-George and Swap (1982) asserted that the willingness to take risks is one of the characteristics which could help consumers do an online transaction.

Trust is a crucial factor in business to consumer (B2C) e-commerce. The same is important as a customer is involved in it and the customer has to have faith to buy the company's products or services. The same on the Internet happens even when the trader is unknown. Established brands merchandise may not help because the online consumer may switch to an unbranded trader. Here comes the element of trust.

Security

Another widely accepted element of e-commerce is the privacy and security of the user. This is applicable to both the government and industrial organizations. The perception of risk when it comes to the Internet security is a major concern for experienced and inexperienced users of Internet technologies as per Miyazaki and Fernandez (2001).

Awareness

An awareness of the latest information systems (IS) domain, is crucial in the use of e-commerce. When the customer uses the online banking services, the new knowledge to customers about the bank's online presence is crucial. For someone

to reach the website, it is important for the person to know what the name of the website is.

Lack of awareness and knowledge are great barriers to online banking services and also to the adoption to the e-commerce activities. Also the users of e-commerce look at ease of use, compatibility, self-efficacy, use of the e-commerce activity, facilitating conditions, to use e-government services/system.

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Accessibility

The accessibility to the Internet is a major factor as it is the source of information and services. Thus, a well-designed e-commerce website could be crucial in providing the user public information and increase their participation. E-commerce websites can serve as a tool for both communication and relations for the customers and general public. Information and data can easily be shared with and transferred to external stakeholder (Moon, 2002).

The quality of the user interface is also crucial in the use of the e-commerce websites. Thus for a website, the user interface design factors like information design, visual design and ease of navigation affect the trust of the user on the company's website.

2.3 TYPES OF E-COMMERCE PROVIDERS AND VENDORS

Suppliers are a critical part of the e-commerce model of business. In this whole transaction and dealing with suppliers the most important thing is relationships. Thus, through this model the company is ideally ensuring a better problem free delivery and an assured supply. Not only this, through online transactions, one can also ensure discounts and other preferential treatment.

The supplier of materials and parts might just want to provide a full range of information, technical support, and manufacturing knowledge and can be effective in the technology know-how transfer.

2.3.1 Manpower Associated with E-Commerce Activities

There are a set of programmers, website designers, architects for websites, business agency employees, customer care employees, etc., who are an important part of e-commerce activities. The manpower has to work 24*7 as the website operates all 24 hours in a day. There could be a time when the manpower will have to be available on weekends too. This is not the case when there is a recruitment of manpower in a physical set up where the working hours are limited and there is no overtime for a worker. Thus working in e-commerce is a very challenging job for an employee. The company has to make sure that it is opening up opportunities for the employees to be better trained and motivated so that one could contribute idea and encourage employee participation.

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Organizations might not always develop into learning organizations. Many a factors brings in this learning change. When the organizations grow, they might not have the same capacity to learn as the company structures becomes rigid. Thus, problems arise, and one needs a proposed solution. These solutions are only short term, and this is what one calls a single loop learning. Thus, the same will re-emerge in the future.

For a company to go online, some organizations have to be restructured. Here, one stresses on small number of employees to work more effectively. The employees working in the e-commerce domain will have to take on a competitive advantage, and thus needs to learn faster as compared to competitors. This process of recruitment starts well in advance by the initiation of Candidate Request Form (CRF) forwarded by the process owners to the HR department. This includes the job analysis for better understanding of the recruiters. If a business needs twenty additional agents to login in the month of November then the recruitment team has to start hiring in the month of July to make a batch of thirty people join in the month of August and by the time the candidates finish training of two and half to three months the business gets agents on the floor and the business does not get affected.

Job evaluation is related with the organization strategy. The type of job evaluation followed will depend on the firm. Here also important is the factor of fairness. In case the evaluation is perceived fair by the individual, then only will they bring in loyalty to the relationship. Also crucial is the flow of work which is a crucial factor in job evaluation. Here the right job evaluation will be critical in making the true synchronization in the flow of work of the people. At this period of time according to *Zingheim and Schuster (2005)*, three types of reward solution gained prominence: 1) Gain sharing 2) Merit pay and 3) Job evaluation.

It is important to evaluate the compensable factor which is any job element that is considered essential to properly evaluating the amount of pay that should be rendered as part of employment. The range of factors that may be used to set wage and pay rates will vary, with some being unique to the task of evaluating hourly wages, others to setting salaries, and still others for work that is compensated on a task by task basis. Along with the actual units produced by the work effort, a compensable factor can also be a job element such as the skill set of the employee, the efficiency of the employee, and even the conditions under which the employee must labour in order to produce the desired results.

Check Your Progress

1. State one major e-commerce activity.
2. What can be said to be a crucial factor in business to consumer e-commerce?

2.4 OPPORTUNITY DEVELOPMENT FOR E-COMMERCE STAGES

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There are various stages of development of e-commerce. The same will have their respective opportunities for e-commerce activities. The stages of e-commerce development are as follows:

First stage companies for e-commerce firms would be majority of distributors. It is true that less than 5 percent of all demand online will make up for 60 per cent of most of the companies. The second stage firms for the e-commerce distributors sell from 5 to 12 per cent of demand online and also feel there is a need for shelf technology. Online software market today is good and the price is coming down. The overall average for online sales in B2B distribution is 12 percent of demand. The third stage firms could be selling 12 -25% of total demand online. These could be the mid-size and larger firms that have a sales of $200 million. Some of these e-commerce firms are PIM, Search, and Mobile App. The fourth stage firms can sell 25 per cent to half of demand online. These firms are strong technologically and have huge budgets for investment when it comes to software and people.

The fifth stage firms could be said to be the most advanced in the distribution market and can have 50 per cent or more of their demand online. These are also known as catalogue distributors and will use the new Internet based models for their distribution. They have the best technology and lead the industry.

2.4.1 Components and Factors for the Development of the Business Case

Online marketing is about getting in front of customers every way possible. This can include search, social media, or any other online destination where the firm will be able to attract customers or get in front of them with a message. The process starts by understanding the business and who the customers are. From there, a plan is put together that will hit every channel that will have the most impact on the business. If search traffic is the most important aspect of what a firm needs, one can utilize search engine optimization or optimizing the campaigns to make sure one is getting the most out of money.

- **Business consulting:** Sometimes it can be hard to stay on top of everything and making sure one is running the business the best way possible. One can take the help of an outside consultant with experience catering to diverse business needs to create efficiency in the business.
- **Creativity:** Push marketing, sales, and traditional tactics for reaching customers are evolving rapidly. In order to get the message across one needs outstanding creative that people love to share and spread around.

One requires an entire team of developers, designers, and social media experts that are constantly creating new content and media that people out there love for this purpose.

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2.4.2 Steps to Design and Develop an E-Commerce Website

There are many steps to creating a good website:

Page design

A web page has to be designed to accommodate the company's content. Web design is a broad term covering many different skills and disciplines that are used in the production and maintenance of websites. The major areas of web design entail the standardized code, web graphic design, user experience design, interface design, and proprietary software, and search engine optimization.

Web design describes the design process relating to the front-end (client side) design of a website that includes the writing mark up, along with the web development. Web designers need to have an awareness of usability and create a mark-up and need good knowledge of web accessibility guidelines.

Web pages have to be well laid out to improve navigation. The page layout has to be consistent on different pages. The page width for aligning objects and in layout design are also crucial. Most of the good websites have a width close to 1024 pixels. Most website pages are centre aligned, so that objects look aesthetically pleasing.

Fluid layouts have replaced the HTML-table-based layouts. A design has to be broken down into units (content blocks, sidebars, navigation areas advert areas,) which are sent to the browser and are fitted into the display window by the browser. Also needed is a good visual design on a website that is pleasant to the target market. The same could target a particular age group or strand of culture based on the trends of its audience. The designing is based on the type of business website, aesthetics or overall design, content, navigation and the capability for the users to find the desired information or products etc.

The page structure of your website will help organize the elements and ideas for the consumers. The structure of the website has to be decided based on the names of the navigation buttons and links among the various pages on the site.

The company should have a logical and easy to follow navigation system so that the visitors can reach their desired page or content as quickly as possible.

- **Home Page:** Home page is the first page most visitors will see. The same is also important in search engine rankings. The home page should give a clear summary of what a site is about, the products or services and instructions on how the visitors should utilize the facilities on the website. The home page should provide links to every page on the site.

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- **Contact Details:** The web is an impersonal medium so that user should be able to easily contact the company via an email address or telephone number. In case an address is followed by the directions, maps, etc., then this could be helpful information on the website.
- **Enquiry Form:** The site should, have an online form at the top level of the navigation system. Thus the users can ask questions, give you feedback and send request quotations on the website.
- **Products & Services:** The product or services pages will describe the offer. The website should be ecommerce-enabled site for the users to purchase the products.
- **Information Pages:** The Information Pages could ensure the content contains keyword-rich phrases for encouraging the search engines to return to the site. This information pages should have the:
    - o Company Profile
    - o Frequently Asked Questions (FAQ's)
    - o Testimonials
    - o Case Studies
    - o Newsletters

The front end is the portion of an e-seller's business processes through which customers interact, including the seller's portal, electronic catalogues, a shopping cart, a search engine, and a payment gateway. For example, when one books a hotel at a website, he will go through the electronic catalogue, find the brand through the search engine and make the payment through the payment getaway like for example HDFC or Axis bank.

The back end activities are the ones which support online order-taking. This will entail the fulfilment, inventory management, purchasing from suppliers, payment processing, packaging, and delivery. For example when on order gifts from Archie's website ,then the order is passed to the backend employees to process the rode and deliver it to the doorstep of the consumers within a set period of time. Websites like Sveentymm.com also send an email to the consumers which is a part of the function of the backend to know if they are satisfied with their purchase.

One of the backend function is designing the web page. A web page has to be designed to accommodate the company's content. Web design is a broad term covering many different skills and disciplines that are used in the production and maintenance of websites. The major areas of web design entail the standardized code, web graphic design, user experience design, interface design, and proprietary software, and search engine optimization.

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Initially websites were just a name on the online brochures. This delighted the customers for sending and receiving email. In a span of 10 years the web has become a vital site for collecting email addresses and contact details of users. Websites are today becoming the first contact many of customers. This got enhanced when Google which became the dominant search engine and Search Engine Optimisation came into practise. Google, became an advertising site which earned on the basis of pay-per-click basis. Blogs came up and increased the pool of links. Niche marketers used the strengths of these thousands of blogs for selling products through affiliate schemes and running pay-per-click advertising. This increased Internet revenues to the masses. Today marketing is done through social websites like Youtube, Facebook, Flickr and Twitter which became new channels for marketers.

Check Your Progress

3. What is web design?
4. What is a home page?

2.5 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. Online shopping is one of the major e-commerce activities. It entails shopping of through the Internet.
2. Trust is a crucial factor in business to consumer (B2C) e-commerce.
3. Web design is a broad term covering many different skills and disciplines that are used in the production and maintenance of websites.
4. Home page is the first page most visitors will see. The same is also important in search engine rankings. The home page should give a clear summary of what a site is about, the products or services and instructions on how the visitors should utilize the facilities on the website. The home page should provide links to every page on the site.

2.6 SUMMARY

- Online shopping is one of the major e-commerce activities. It entails shopping of through the Internet.
- B2B is an operation of e-commerce which refers to electronic exchange of products, and services which is done between two or more businesses and not between businesses and consumers.

- The matrix of types of e-commerce shows the various operations which could be conducted through e-commerce. These could be B2B, B2C, C2C, C2B, etc.
- There are many elements which impact the e-commerce arena. One of them is the trust of the consumer. Johnson-George and Swap (1982) asserted that the willingness to take risks is one of the characteristics which could help consumers do an online transaction.
- Suppliers are a critical part of the e-commerce model of business. In this whole transaction and dealing with suppliers the most important thing is relationships.
- There are various stages of development of e-commerce. The same will have their respective opportunities for e-commerce activities.
- A web page has to be designed to accommodate the company's content.
- Web design is a broad term covering many different skills and disciplines that are used in the production and maintenance of websites.
- The major areas of web design entail the standardized code, web graphic design, user experience design, interface design, and proprietary software, and search engine optimization.

2.7 KEY WORDS

- **Customer Relationship Management:** It is an approach to manage a company's interaction with current and potential customers.
- **Search Engine Optimisation:** It is the process of maximizing the number of visitors to a particular website by ensuring that the site appears high on the list of results returned by a search engine.

2.8 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short-Answer Questions

1. What are the various activities of e-commerce? Discuss.
2. Write a short-note on matrix of e-commerce types.

Long-Answer Questions

1. Explain the various modes of operations associated with e-commerce.
2. Examine the steps to design and develop e-commerce website.

2.9 FURTHER READINGS

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UNIT 3 INTERNET: THE BACKBONE FOR E-COMMERCE

Structure

3.0 INTRODUCTION

The Internet is a world-wide network of computers that transmit information through TCP/IP protocol. The term 'internet' in the lower case denotes bridged networks in common, whereas the capitalized term 'Internet' refers to the global network of networks that is publicly approachable and administratively uncontrolled. The Internet is the foundation for electronic mail (e-mail), Peer-to-Peer (P2P) applications, the World Wide Web (WWW), Voice over Internet Protocol (VOIP) and hundreds of other purposes. Although the basic data being broadcast in each of these cases may be almost indistinguishable, each case requires particular handling of the data regarding speed, data integrity, error correction and redundancy. The success of the Internet is, therefore, assigned to its flexibility in rendering a programme for the different data protocols and their individual requirements.

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The antecedents of today's Internet go back to October 1969, when ARPANET of the US Defense Department first became online. Although this was not the first long-range computer network, still it was the first to use packet shifting methods to ascertain reliability, data integrity and optimized bandwidth utilization. This was totally different to the more common circuits witching methods, which called for a dedicated, fixed route among two communicating computers. Until the United States' National Science Foundation established their university network by January 1983, the TCP/IP protocol was not enforced. Only after the discovery of WWW in 1991 by Tim Berners-Lee, the Internet gained popularity in the general public. The WWW made the publication of documents possible that could be accessed (and inter-linked) in a simple manner with no necessity of opening an e-mail account on each machine accessed.

3.1 OBJECTIVES

After going through this unit, you will be able to:

- Discuss the categories and components of the Internet
- Describe the various Internet services
- Examine the strategic capabilities of the Internet

3.2 EARLY AGES OF INTERNET AND INTERNET SERVICES

Technically, the Internet is known as 'the Network of Networks'. It is like a phone system that connects almost anywhere around the world. It exchanges information and acts as global link between small regional networks.

The history of the Internet starts in the 1950s and 1960s with the development of computers. The evolution of Internet started with point-to-point communication between mainframe computers and terminals which later expanded to point-to-point connections between computers and packet switching. A packet switched network is a digital communications network that works with transmitted data irrespective of type, structure and sized blocks known as packets. The network through which packets are transmitted is a shared network which routes each packet independently from all others and allocates transmission resources as needed. In 1982 the Internet Protocol Suite or TCP/IP was standardized to emerge the concept of a network of fully interconnected TCP/IP networks called the Internet had been introduced. Commercial Internet Service Providers or ISPs emerged rapidly between 1980s and 1990s. The Internet was commercialized in 1995. Since the mid-1990s the Internet included various features including e-mail, instant messaging, VoIP phone calls and the WWW with its discussion forums, blogs, social networking, and online shopping sites.

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The Internet services offer a gateway to a myriad of online databases, library catalogues and collections, and software and document archives, in addition to frequently used store-and-forward services, such as UserNet News and e-mail. The widely used Internet services are as follows:

E-mail

E-mail is the prime Internet service that facilitates services to people or users across the world. Full Internet connectivity is not required for this. For example, an electronic address provides these services to FTP sites through which mail can be exchanged. Other Internet services, such as IP address resolver, Archie Lookup, WHOIS service is done via e-mail.

File Transfer Protocol (FTP)

FTP is also prime Internet service that acts as protocol and transfers files over TCP/IP network (the Internet, UNIT, etc.). Once HTML page is developed on a local machine for a Website, it is first uploaded to the Web server through FTP. Local machine is the machine on which you are initially logged into. It includes functions to log on to the network, gives a list of directories and copies files. FTP transfer is possible by entering URL preceded with ftp:// within address bar of a Web browser. The FTP operations can be performed by issuing FTP commands at the command prompt or by using FTP utility running under a graphical user interface on Windows OS. FTP tasks can be performed through a browser. For example, type an IE address bar URL as ftp:// to get ftp services. For example, ftp://YourLoginName@IPaddress.

Telnet

Telnet is used to connect remote network computers. It is the Internet service that executes commands on remote host as if you are going to log in locally. For this, the machine name and valid user name are required to be connected. The commands that are issued on telnet are as follows:

***Telnet hostname*:** A connection to the host name is opened by this command. For example, issuing the command as 'telnet abc.maths.edu' with that machine which keeps the required information of abc.maths.edu site can connect you.

***Telnet address*:** It gives the IP address of the connected host.

Archie

If some programs are installed in a system unit and you want to know the availability of the program on the Internet, you can get to know the machine along with such programs via Archie. Basically, Archie is a program that searches files anywhere on the Internet by filename. This facility is maintained by a database with the Internet sites accessible via anonymous ftp.

The Archie server can be accessed via Telnet, for example, 'Telnet archie.rutgers.edu'. For getting Archie server login to 'Archie'. It requires no

password. You can look for files by its full name. For this, either 'set type exact' syntax is used or you can use 'set type sub' syntax. The 'set type sub' syntax is used if the name of the required file is known. The 'find file-name' syntax is also used to find the required file name.

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Gopher

The Gopher protocol supports client-server software that searches files on the Internet. A Gopher client is required for validating and testing of Gopher publishing service. For example, WS Gopher 1.2 is available on the Internet as shareware. The server based text files are hierarchically organized and viewed by end-users. These end-users access the server by using Gopher applications of remote computers. Gopher browsers initially display the text-based files. Most of the files along with database are available on Gopher that converts HTTP compatible formats and makes them available on the Internet.

Finger

Finger service gives information about users, for example, username, person's first name and last name, information about recently logged in and also where they logged in. But the users must enter the required information where they get registration for particular e-mail services. Finger is also used to get a list of users who are currently logged into the host. In fact, the Finger program accepts input as an e-mail address that returns information of user. In some systems, Finger gives the information about the currently logged on users.

World Wide Web (WWW)

WWW provides hypertext access to documents located anywhere on the Internet. It is a very successful distributed information system. It is basically client–server data transfer protocol that communicates via application level protocol. Its structural components are clients–browsers, servers and caches. The Internet and semantic components include HyperText Transfer Protocol (HTTP), HyperText Markup Language (HTML) Extensible Markup Language (XML) and Uniform Resource Identifiers (URIs). The clients who get various sites requested to the server via HTTP determine the structure of WWW. Then Web pages constructs HTML consists of graphics and sound embedded files. For running the complete system, TCP/IP, DNS networking protocols are required.

The reason behind the evolution of Java programming language is to develop distributed application. Distributed application means many CPUs are inter-connected through different network topology so that each CPU can communicate with one another. Java introduced the Remote Method Invocation (RMI) technique to implement distributed application. The **java.net** package provides classes and methods to develop networking-applications through different network protocols.

A group of computers connected by cable to share information is popularly known as network. A network is a set of computers and peripherals that are physically

connected. Networking enables sharing of resources and communication. Java applets can be downloaded from a website. This is one of the main attractions of Java. Networking in Java is possible through the use of **java.net** package. The classes within this package encapsulate the socket model developed by Berkeley software division. The network requires some components, such as:

- Server
- Client
- Peer
- Protocol
- Physical media
- Physical devices

Servers provide services to the client. If a server provides application services, then it is treated as an application server.

The **client** accesses services from the server. Peer is a computer that works as a server as well as a client.

Clients

A computer, which requests for some service from another computer, is called a **client**. The one that processes the request is called a **server**. A **server** waits till one of its **clients** makes a request. It can accept multiple connections at a time to the same port number. Multithreading is used to serve multiple users at the same time.

3.3 NETWORKING CATEGORIES

Computers are connected by many different technologies. An interconnection between more than one computer, over a virtual and shared connection, in a client-to-server or peer-to-peer manner is called a network. That is to say, so that the flow of information is accommodated, computer resources are connected using networks. This is just the opposite of the old terminal-to-host hardwired connection. Although a network can support terminal-to-host connections through terminal emulators or a terminal server, it offers a lot more flexibility in switching connections. The disadvantage of this explosion in terms of sharing information arises when one computer wishes to share its information system with another which has different network protocols and different network technology. As a result, even if you could agree on a type of network technology to physically interconnect the two computers at different locations, your applications still would not be able to communicate with each other because of the different protocols.

A very basic question arises about the requirement of networks. This may be justified with the help of the following points:

- Sharing of resources can be easily done.

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- Reliability—There is no central computer, so if one breaks down you can use others.
- Networks allow you to be mobile.

The term networking applies to:

- The exchange of information among institutions, groups or individuals.
- The process of data communications or electronic voice.

Communication networks are broadly categorized into three categories as follows:

Local Area Network

The Local Area Network (LAN) technology connects machines and people within a site. LAN is a network that is restricted to a relatively small area. LANs can be defined as privately-owned networks offering reliable high speed communication channels that are optimized to connect information processing equipment in a small and restricted geographical area, namely, an office, a building, a complex of buildings, a school or a campus.

A LAN is a form of local (limited-distance), shared packet network for computer communications. LANs interconnect peripherals and computers over a common medium so that users are able to share access to peripherals, files, databases, applications and host computers. They can also provide a connection to other networks either through a computer, which is attached to both networks, or through a dedicated device called a gateway.

The components used by LANs can be categorized into hardware, cabling protocols and standards. Various LAN protocols are Ethernet, Token Ring, Asynchronous Transfer Mode (ATM), NetBIOS and NetBeui, TCP/IP, Fibre Distributed Data Interchange (FDDI), SMB and IPX/SPX.

Metropolitan Area Network

Such large geographic areas as districts, towns and cities are covered by a Metropolitan Area Network (MAN). By linking or interconnecting smaller networks within a large geographic area, information is conveniently distributed throughout the network. Local libraries and government agencies often use a MAN to establish a link with private industries and citizens. It may also connect MANs together within a larger area than a LAN. The geographical limit of a MAN may span a city.

In a MAN, different LANs are connected through a local telephone exchange. Some of the widely used protocols for MAN are ATM RS-232, OC-3 lines X.25, Asymmetrical Digital Subscriber Line (ADSL), Frame Relay, Integrated Services Digital Network (ISDN) and (155 Mbps), etc. These protocols are quite different from those used for LANs.

Wide Area Network

This technology connects sites that are in diverse locations. Wide Area Networks (WANs) connect such large geographic areas, as the world, India or New Delhi. There is no geographical limit of WAN. This kind of network can be connected by using satellite uplinks or dedicated transoceanic. Hence, a WAN may be defined as a data communications network covering a relatively broad geographical area to connect LANs together between different cities with the help of transmission facilities provided by common carriers, such as telephone companies. WAN technologies operate at the lower three layers of the OSI reference model. These are the physical data link and network layers.

It also uses switching technology provided by local exchange and long distance carrier.

Packet switching technologies, such as Frame Relay, SMDS, ATM and X.25 are used to implement WAN along with statistical multiplexing to allow devices to use and share these circuits.

3.4 CHARACTERISTICS OF INTERNET

Some of the characteristics of the Internet are:

I. **World Wide Web:** The Internet application that is currently drawing maximum attention is the World Wide Web (WWW). It has dramatically influenced the online world and continues to grow in popularity.

II. **Direct Communication:** Through e-mail (electronic mail), messages can be sent to or received from any part of the world within a few minutes.

III. **Round-the-Clock Availability:** Information on the Internet is available to users 24 hours a day.

IV. **Central Repository of Data:** The Internet is like a huge central warehouse of data that people from all over the world can access.

V. **Search Engines:** These are like directories which help to get any kind of information from the world within a few seconds.

VI. **Advertisement:** A company can advertise its products/services through the Internet.

VII. **E-Commerce:** The Internet is increasingly being used for conducting monetary transactions. Through the Internet, you can shop and pay through your credit card or ask your bank to transfer your money to a different account, without even leaving your desk.

VIII. **Distance Learning:** Several online distance learning courses are now being offered by Indian and foreign universities on the Internet.

IX. **BBS and New Services:** The Internet is perhaps the cheapest medium for online help. BBS services are available on the Net through which you can ask questions and get immediate troubleshooting assistance.

X. **Wide Area Networks:** Using the Internet, organizations can collect and compile information from offices spread over large geographical areas.

XI. **Shareware Software:** The Internet is also a great medium for downloading free software. You can get a truckload of free games, utilities and trial versions of software through the Net.

Key Concept

The Internet has made things simpler. It can serve the following purposes:

I. **Direct Communication:** You can send messages to family and friends, business associates and acquaintances using the electronic mail facility. Using electronic mail, you can send and receive messages within a few seconds anywhere in the world. Using Internet Relay Chat (IRC), you can communicate online with people over the Internet. You can log into a chat room and converse with others by typing messages that are instantly delivered. With the improvement of network technologies and increase in broadband, not only can you use text messages but also graphics, audio and video for communication with other people.

II. **Online Shopping:** Logically, the Internet has removed all barriers of distance and nationality. You can shop for products and services across the world by logging on to a Web portal. You can also pay your bills online using credit and debit cards. You can also transfer money between different accounts with the click of a mouse.

III. **Distance Education:** The Internet provides a perfect medium for knowledge sharing and information dissemination. Courses are available on the Internet. You can register and pay online, and complete a course on different interest areas. You can also pursue specialized higher studies now in the comfort of your own office or home.

IV. **Knowledge Base:** The Internet provides a rich information base that people from across the globe can access. In fact, it is one of the richest information bases that can be accessed at the click of a mouse. Using search engines, you can search for detailed information on any topic of your interest.

V. **Banking:** Banks are using information technology to provide online banking facilities to their customers. Using the Internet, you can now view your account details, get drafts made, request for chequebooks and transfer money from one account to another. The use of ATMs has shifted the mundane back-office work to the customer himself. Instead of hiring an army of bank clerks, banks can now uses ATMs to considerably reduce time and operational costs.

VI. **Travel:** Using the Internet, travel agencies can publish their services on the Web along with the latest discounts, packages and availability details, so that customers can compare rates, make online bookings and avail discounts without having to run around multiple offices.

VII. **Bill Payments:** The government sector has also realized the benefits of IT. Now you can make online payments for public utilities such as water, electricity and phones, using credit cards as the payment medium.

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Check Your Progress

1. What is FTP?
2. What is Telnet used for?
3. What is Local Area Network?

3.5 COMPONENTS AND ELEMENTS OF INTERNET

The following are the various components of LAN:

3.5.1 Server

It is the most powerful computer of the network. In a local area network, usually a powerful microcomputer or a super microcomputer with the power of a minicomputer is used as a server. There are two types of servers normally employed in a local area network. They are *dedicated* servers and *non-dedicated* servers.

In a dedicated server, the server computer performs functions and services of the whole network. It helps to efficiently run user applications and increases the overall system cost. Users cannot run their applications directly in a dedicated server. It provides e-mail service, sharing of multiple hard disks, and sharing of other resources and faster response time. For larger networks with heavy load, dedicated servers are usually employed.

In a non-dedicated server, apart from the role of a network controller, a server also acts as an individual workstation. The server is equipped with large memory. Network operations demand only a portion of server memory. The remaining portion of the memory may be used for the user applications. Under light load conditions, it is advisable to use a non-dedicated server. Some servers can operate on both modes, according to the requirement of the user.

File Server

The primary goal of a computer network is to share data among several users. They also make their attached disk drives, printers, modems and unique communication links available to the various client stations. Providing one computer with one or more hard disks facilitates this. All client stations share these hard disks. Clients can make their requests to access any of the shared facility to the server. The file server is a powerful computer, which runs special software. It provides the files and other shared resources to different users in the network. It provides facilities like user authentication, security to various user programs, and

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data. It can be accessed through Network Operating System (NOS). Typical configurations of a server are Pentium 4 machine with 128 MB or higher capacity RAM, 40 GB or higher capacity hard disk, to serve upto 10 nodes or workstations.

All activities of a file server can be monitored and controlled from the monitor called console. The network administrators are given special privileges. They are given supervisory passwords. They perform the network administration operation for the entire network. Any user of the network needs to get a new network service, they have to contact the network administrator and make a request for the specific service they need. The file server has a large memory, which is used for caching directories, and files and hashing directories. Novell Netware and Windows NT are the two network operating systems that run on a server machine.

3.5.2 Workstation

Another important component of a network is the workstation or a client. A workstation is an individual computer with capabilities to communicate with other machines. It must be equipped with the hardware and software necessary to connect to a LAN. Usually a Network Interface Card (NIC) or an Ethernet card or an Arcnet card is used for this purpose. Part of the network operating system is also available in the workstation. A workstation can communicate with other workstations or to the server. The hardware requirement for a workstation depends on the application and the size of the network. In a typical LAN of a university computer center, a Pentium III system with 64 MB RAM and 4 to 8 GB hard disk capacity, with necessary network interface card can be used for a typical workstation. In general, the memory and hard disk capacity of a workstation is much less than that of the server.

Network Interface Unit

Every computer on the network needs one add on card called Network Interface Card (NIC) or Ethernet Adapter or Network Interface Adapter. The role of NIC is to move the serial signals on the network cables, or media into parallel data stream inside the PC. In some cases, two or more such NICs are used in the server to split the load. These interface units also have the important jobs of controlling access to the media. This includes activities known as carrier sense (listen before transmit), sequential station number, and token passing, which are discussed in the later chapters. The above activities are known as Media Access Control.

Transmission Media

The data signal travels through this medium. There are two general categories. They are bounded (guided) and unbounded (unguided) medium. Twisted pair, coaxial cable and fibre optic cables are all bounded media. The data signals travel within the boundaries of the transmission media. On the other hand, microwave and satellite transmissions, both travel through the air, which has no boundaries, hence called un-bounded transmission.

3.5.3 Hub

The network hub is a centralized distribution point for all data transmission in a network. Hub may also be referred to as a concentrator. Data packet from a NIC arrives at the hub. The hub receives and rebroadcasts them to other computers connected to it. In general, the hub network is a passive device. It does not know the destination of a received data packet. Hence, it is required to send copies to all the hub connections. Hubs can be classified into the following three categories:

- Stackable and non-stackable hubs
- Active and passive hubs
- Intelligent and non-intelligent hubs

Stackable hubs are hubs that can be stacked or interconnected to make a single hub appearance. They are useful for venders to make hubs of size suitable to customer requirement. Non-stackable hubs cannot be interconnected. They are always provided only a fixed number of connections.

The hubs that connect to the network backbone are known as active hubs. The hubs, which connect only to active hubs, are known as passive hubs.

Intelligent hubs contain a special firmware that can be accessed by remote workstations. The firmware is known as Simple Network Management Protocol (SNMP). Network performance and network status data are read from SNMP.

3.5.4 Repeater

A repeater is a communication device that connects between two segments of the network cable. It retimes, regenerates, strengthens the digital data and sends them on their way again. Repeaters are often used to extend the cable length to enlarge LANs. Wide area network contain many repeaters. Ethernet also frequently uses repeaters to extend the length of the bus.

Router

A router transfers data between networks. It is also possible for a router to transfer data between different compatible network technologies, such as Ethernet and IBM token ring. Since Internet consists of thousands of different network technologies, routers are an integral part of the Internet. A router has the address on the network. A bridge does not have an address. Hence, a router can act as an intermediate destination. In other words, a computer can send a data packet to the router of another network. The router will transfer the packet to the other network. On the other hand, the bridge must examine all the packets to determine which packets to transmit between networks. As such, computers never send packets directly to a bridge. A router examines a packet only if it contains the router's address.

A router also can act as a bridge. Such a router is known as a *brouter*. The brouter receives the packet and examines whether it supports the protocol used by the packet. If not, it simply drops the packet. The packet is bridged using the physical address information.

3.5.5 Gateway

Two dissimilar networks can be connected by means of a gateway. For example, a mainframe can be connected and accessible to a PC network by means of a gateway. Unlike routers, a gateway converts the format of the data sent between two networks. A router adds only addressing information to the data packet. Routers never change the content of the message. But a gateway has to identify the protocols used in the networks, and recognize the data format and convert the message format into suitable format to be accepted by the other network. Wide area networks often use gateways because there is a large number of dissimilar networks present in a WAN. Gateways provide good connectivity to different kinds of networks on the Internet.

3.5.6 Modem

Another significant network component is modem. The term Modem is the shortened version of the name modulator–demodulator. Modem provides two-way communication facility between a computer network and telephone network. As Wide Area Network uses the existing telephone network to connect to a distant network, it always uses a modem to dial-up the telephone network. Modem converts the digital data from the computer into useful analog signals that can be transmitted through a telephone network. Similarly, signals from the telephone channels are converted back into digital data suitable for a computer.

3.5.7 Bridges

Like repeaters, bridges are used to connect similar LANs together, for example, Ethernet-to-Ethernet and operate at the bottom two layers of the OSI model, i.e., physical layer and data link layer. As it operates on the second layer of the OSI model, it relays only necessary data to other signals. MAC addresses (physical addresses) are used to determine whether data is necessary or not. It passes information from one LAN segment to another based on the destination address of the packet. In other words, when a bridge receives data through one of its ports, it checks the data for a MAC address. If this address matches that of the node connected to the other port, the bridge sends this data through this port. This action is called forwarding. If the address does not match with any node connected to the other port, the bridge discards it. This action is called filtering. Unlike repeaters, bridges have buffers to store and forward packets if the destination link is congested with traffic.

The main advantage of a bridge over a repeater is that it has filtering action. If any noise on Ethernet occurs because of collision or disturbance in electrical

signals, the bridge will consider it as an incorrectly formed frame and will not forward it to the segment connected to the other port of the bridge. Note that a bridge can relay broadcast packets and packets with unknown destinations.

So far, you have seen that at the maximum, four repeaters can be used to connect multiple Ethernet segments. However, if a bridge is provided between repeaters, this limit of four is increased. The maximum number of bridges is not specifically limited.

From an architecture point of view, bridges are protocol-independent devices and are very simple. They do not perform complex processes on the data packets travelling through them, such as the evaluation of the network as a whole in order to make end-to-end routing decisions. They simply read the destination address of the incoming data packet and forward it along its way to the next link. Therefore, bridges are inexpensive and fast. There are bridges called cascading bridges that are used to support multiple LANs connected by multiple media.

Dissimilar LANs, such as Ethernet-to-token ring can also be connected with the help of a bridge known as encapsulating bridge. The function of an encapsulating bridge is also very simple. It encapsulates the originating LAN data along with control information of the end-user LAN. Bridges with a routing function between LANs are also available.

Media Access Control (MAC) Bridge

This is used to connect dissimilar LANs, such as Ethernet-to-token ring using encapsulation or translation. This bridge translates the original packet format from the requesting LAN segment by encapsulating or enveloping with control data specific to the protocol of the destination LAN segment.

Address Table

As explained, each bridge should have an address table that indicates the location of different computers or nodes on the segments of LAN. More specifically, it indicates the connection between nodes and ports. When a bridge is booted for the first time, this table is found to be blank. Now, the question arises as to how this table is filled with appropriate addresses of different nodes attached to ports. Most of the bridges are called adaptive or self-learning bridges because they learn the location of the node and associated port themselves and make a list of nodes attached to each segment.

When a bridge receives a data packet from a computer, it first copies the physical address of that computer contained in the packet onto its list. Afterward, the bridge determines whether this packet should be forwarded or not. In other words, the bridge learns the location of the computer on the network as soon as the computer on the network sends some packet.

NOTES

If a computer does not send a packet, the bridge will never be able to determine its position and unnecessarily forward the packet on the network. Fortunately, this cannot happen because a computer with network software attached to a network transmits at least one frame when the system first boots. Furthermore, computer communication being bidirectional, there is always an acknowledgement for each received packet.

Bridge Protocols

Bridge protocols include source routing transparent, source routing protocol and spanning tree.

3.6 UNIFORM RESOURCE LOCATOR

An Internet address usually begins with http://.

http://www.rediffmail.com/index.html

where

http:// – standard protocol (Hyper-Text Transfer Protocol)

www – World Wide Web

rediffmail.com – domain name

index.html – file name of the Web page

- Every single document on the Web page has its own unique URL.
- Type the URL in the address box of the browser and the browser is directed to the document's location.

ftp:// – File Transfer Protocol

https:// – Secure Hypertext Transfer Protocol

Uniform resource locator (URL) is a pointer that avails specified resources across the net. Resource simply means information containing files or directories. It is referenced with query to available databases via search engines, such as Google or Yahoo. An example of URL that appears on the address bar is as follows:

http://aaa.bbb.edu/flower.html

Table 3.1 specifies the details of the example URL:

Table 3.1 *URL Details*

URL Part	Function
http	The protocol specifier
aaa.bbb.edu	The domain name
flower.html	The page location

The ***http*** is used as protocol where information resides on domain named as ***aaa.bbb.edu***. The information that resides on host machine is taken as ***flower.html***. The host machine can be protocol dependent or host dependent. Component of URL is known as path component. URL is sometimes specified as 'port'. Port means it is a port number by which TCP connection is possible to the remote host machine. The default port for protocol is used if port is not specified. For example, `port 80` is known as default port for HTTP. The two ports, `port 20` and `port 21` are used by ftp. The alternative port can be used as follows:

http://aaa.bbb.edu:80/ flower.html

That is why URL represents the full specification to a page.

URL Encoding

Table 3.2 lists some specific symbols and characters used by URL. These are, in fact, URL encoding.

Table 3.2 *Used Symbols and URL Encoding*

Specific Symbols and Characters	URL Encoding
;	%3B
?	%3F
/	%2F
:	%3A
#	%23
&	%24
=	%3D
+	%2B
$	%26
,	%2C
%	%25
<	%3C
>	%3E
~	%7E
%	%25
<space>	+ or %20

Note: The <spacebar> is frequently used and '+' sign is reserved for its URL encoding. For example, string 'A B' in URL is encoded as either 'A%20B' or 'A+B'.

If you want to search the information as 'computer graphics basics' in Google search, you just type the text that has to be searched.

After pressing the **<ENTER>** key or clicking on '**Google Search'** button, you can get the resulting URL in the address bar.

If you analyse the result of URL **[http://www.google.co.in search?hl =en&source= hp&q=computer+graphics+basics + &meta=&aq=f&oq=]**, the result comes as the <space> character between **computer+graphics+basics** in URL encoded as '+' symbol.

3.7 SHOPPING CART

A shopping cart is a common term used in e-commerce. In supermarkets, a shopping cart is a way to transport purchased goods to the billing counter from where they can leave. When it comes to e-commerce, the shopping cart is a piece of e-commerce software which is present in the web server that allows visitors to get into an Internet site and helps them to select items for eventual purchase. It has been seen many a times that on websites many customers select a merchandise and put it in the cart but they do not complete the final purchase. There is a lot of research going on the abandonment of the shopping cart. The customers do fill the cart with products they like and then wait for the right time to purchase these products. Although there are cookies installed by different companies which do pop in some time one is accessing the net and reminds the customers that he has put in a certain merchandise in the cart. This reminds the customer of purchasing what has been added to the cart. It could lead the consumer to have an impulse purchase.

3.7.1 Cookies and E- Commerce

A cookie which is also known as HTTP cookies or frequently known as browser cookies can be said to be small text files which are stored in a web user's browser directory. They can also be stored in the data folder. Ecommerce websites place cookies on visitors' browsers so that they can retain login credentials. This then allows the companies to provide the customers a customized shopping experience.

Secure websites can use cookies. This validates the user's identity when they browse from page to page. Cookies provide customer log-in, reminders of the shopping cart, reminders of wish lists, 'Welcome back' messages which are customized for the given consumers, etc. They also help retain the customer address and payment information. This makes it helpful for the customer to finish the transaction. The saved details get filled into the boxes automatically and this gives the customer an ease to finish the transaction.

Cookies are of two types. The session cookies will stay on the browser. These cookies retain the information till one closes the website. If a new browser window is open, the same user will then be treated as a new visitor and the login credentials will have to be entered again. Thus, once the website is closed all the saved information will get lost.

Persistent cookies is another type of cookie which has a designated lifespan and will be present in the browser till the period elapses. Thus this cookie can be manually deleted. Websites which make use of the persistent cookies can remember the users even after the browser is closed. Persistent cookies will then retain the shopping carts, and the products which have been added to the cart between sessions. One company which uses persistent cookies is AJio.com.

The cookie starts working when a customer lands on a commerce website for the first time. Here the company's website makes a record of the activity. This is done on the company's remote server. It thus places a cookie in the user's browser files. This cookie will just be a short line of text. It has no information about the user and the user's machine. The cookie will just have the URL of the website that placed the cookie which is a unique generated number and an expiration date for the cookie.

3.7.2 Web Site Communication

A website is a tool to help one communicate business objectives to the online audience in order to build and grow. A visitor should never be confused to exactly what it is that a website is about and what it can do for them. When an online visitor arrives to the website, the visitor should be given the option of how they want to interact with the business. Whatever the business might be the communication is the most important aspect of the site.

3.7.3 Strategic Capabilities of Internet

When a website is launched and implemented, the next thing which the company would look at is its effectiveness in the market. For the same there has to be a strategic analysis of the whole process of e-marketing employed by the company. This can be divided into the following steps:

1. Strategic objectives.

Smith and Chaffey (2001) suggest there are five objectives of e-marketing:

- Sell – Growing sales. This could be done by wider distribution to customers.
- Serve – Adding value to the products to give customers extra benefits online like online dialogue and feedback.
- Speak –Tracking customers and getting close to them by asking them questions, conducting online interviews, monitoring chat rooms, etc
- Save – Saving costs like sales transactions, print and post.
- Sizzle – The last objective could be to extend the brand online. The online website could Reinforce brand values and is crucial in creating brand awareness, recognition and involvement.

2. Strategic analysis

Here the environment is analyzed for opportunities and threat which could affect the company's e-marketing strategies**:**

PESTLE Analysis

PESTLE Analysis or survey of the e-marketing environment include history of firm, macro/micro factors that are relevant including a stakeholder analysis. It is critical to understand the product too through these points of strategy. This classification distinguishes between:

- *Political factors*. These refer to government policy such as the degree of intervention in the economy. What goods and services does a government want to provide? In India, political factor is very critical to the product sector. The liberalization by the government has of course helped out the business in the product sector to survive in recession too.
- *Economic factors.* These include interest rates, taxation changes, economic growth, inflation and exchange rates. Economic change can have a major impact on a firm's behaviour like:
  - o higher interest rates may deter investment because it costs more to borrow
  - o a strong currency may make exporting more difficult because it may raise the price in terms of foreign currency
  - o inflation may provoke higher wage demands from employees and raise costs
  - o higher national income growth may boost demand for a firm's products
- *Social factors.* Changes in social trends can impact on the demand for a firm's products and the availability and willingness of individuals to work. For example, in India, the taste factor are very vital for product.
- *Technological factors:* New technologies create new products and new processes. MP3 players, computer games, online gambling and high definition TVs are all new markets created by technological advances. Online shopping, bar coding and computer aided design are all improvements to the way we do business as a result of better technology.
- *Environmental factors:* Environmental factors include the weather and climate change. Changes in temperature can impact on many industries including farming, tourism and FMCG. With major climate changes occurring due to global warming and with greater environmental awareness this external factor is becoming a significant issue for firms to consider.

- *Legal factors:* These are related to the legal environment in which firms operate. In recent years India has seen many significant legal changes that have affected firms' behaviour. Legal changes in India can affect a firm's costs (e.g. if new systems and procedures have to be developed) and demand (e.g. if the law affects the likelihood of customers buying the good or using the service).Thus the same are critical in the analysis of product.

3. Strategic tools

Some of the strategic tools of marketing have been studied below**.**

Wittington model

Wittington model is used for deploying four generic e-marketing strategies which are as follows; classical, evolutionary, systemic and processual. The classical approach is rational and deliberate process based on analysis and calculation. The reason for it being a deliberate process level rather than emergent is simply because the business units and resources are based on providing all the facilities that are needed to make their customers more comfortable and also provide the customers with good quality of service and student games. This is determined as their main objectives.

Michael Porter generic strategies

Michael Porter has listed a very good framework of e-marketing strategies to choose from in a highly dynamic market. These e-marketing strategies are devised with the prime concern of achieving a competitive advantage over other competitors. The use of the e-marketing strategies is critical in the market opportunity analysis as they will act as a guideline and also the options to choose keeping in mind the Indian consumer.

Michael Porter describes three generic E-marketing strategies which are explained along two parameters: strategic scope and strategic strength. *Strategic scope* is a demand of the market which explains the size and composition of the market the company wants to target. The other dimension here is the s*trategic strength* which is the supply side of the economy and looks into the competitive advantage, strength or core competency of the firm. The three generic E-marketing strategy suggested were product differentiation and product cost (efficiency) and segmentation strategy.

Check Your Progress

4. What is the primary goal of the computer network?
5. In PESTLE analysis, what does government policy refer to?

3.8 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

NOTES

1. FTP or File Transfer Protocol is a prime Internet service that acts as protocol and transfers files over TCP/IP network.
2. Telnet is used to connect remote network computers.
3. The Local Area Network (LAN) technology connects machines and people within a site. LAN is a network that is restricted to a relatively small area.
4. The primary goal of a computer network is to share data among several users.
5. In PESTLE analysis, political factors refer to government policy such as the degree of intervention in the economy.

3.9 SUMMARY

- The history of the Internet starts in the 1950s and 1960s with the development of computers.
- The evolution of Internet started with point-to-point communication between mainframe computers and terminals which later expanded to point-to-point connections between computers and packet switching.
- Technically, the Internet is known as 'the Network of Networks'. It is like a phone system that connects almost anywhere around the world. It exchanges information and acts as global link between small regional networks.
- Telnet is used to connect remote network computers. It is the Internet service that executes commands on remote host as if you are going to log in locally.
- A server is the most powerful computer of the network. In a local area network, usually a powerful microcomputer or a super microcomputer with the power of a minicomputer is used as a server.
- A router transfers data between networks. It can also act as a bridge.
- A loop can cause a broadcast packet or a packer with an unknown destination to circulate through it, thus rendering the network inoperable.
- When it comes to e-commerce, the shopping cart is a piece of e-commerce software which is present in the web server that allows visitors to get into an Internet site and helps them to select items for eventual purchase.

- A cookie which is also known as HTTP cookies or frequently known as browser cookies can be said to be small text files which are stored in a web user's browser directory.
- When a website is launched and implemented, the next thing which the company would look at is its effectiveness in the market. For the same there has to be a strategic analysis of the whole process of e-marketing employed by the company.

3.10 KEY WORDS

- **PESTLE Analysis:** It describes a framework of macro-environmental factors used in the environmental scanning component of strategic management.
- **Modem:** It is a combined device for modulation and demodulation, for example, between the digital data of a computer and the analogue signal of a telephone line.
- **Cookies:** It is a packet of data sent by an Internet server to a browser, which is returned by the browser each time it subsequently accesses the same server, used to identify the user or track their access to the server.

3.11 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short-Answer Questions

1. What are the three categories of communication network?
2. What are the various components of the LAN?
3. Write a short-note on cookies.

Long-Answer Questions

1. Discuss some of the characteristics of the Internet.
2. Describe some of the widely used Internet services.
3. Explain the process of strategic analysis of the e-market business.

3.12 FURTHER READINGS

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UNIT 4 ISP, WWW AND PORTALS

NOTES

Structure

4.0 INTRODUCTION

In this unit, we shall discuss Internet Service Providers (ISPs) and the World Wide Web (WWW). An Internet service provider (ISP) can be defined as an organization which provides services for accessing, participating and using the Internet. They can also be categorized as commercial, non-profit, community owned and many other privately owned service providers. The World Wide Web (WWW) is a network of online content that is formatted in HTML and accessed via HTTP. It refers to all the interlinked HTML pages that can be accessed over the Internet. The final section of the unit will discuss portals.

4.1 OBJECTIVES

After going through this unit, you will be able to:

- Discuss Internet Service Providers
- Explain the significance of World Wide Web
- Describe the advantages of portals

4.2 INTERNET SERVICE PROVIDER (ISP)

Internet Service Provider (ISP) is a company that provides access to internet services. This service provider provides a software package in which you get registration with the providing services. Once you register with username, password and dialling phone number, you can access ISP by paying the monthly fee. This software package is equipped with modem that is connected with internet services.

NOTES

Good ISPs have their own leased-line provided by telecommunication providers. Some of the largest and popular ISPs are At&T WorldNet, MCI, IBM Global Network, UUNet, PSINet, Netcom etc. It is sometimes known as internet access provider. There are 183 ISPs in India.

ISP provides Web, Email and VoIP etc. as main services. ISP includes domain name registration and hosting, internet transmit, dial-up or DSL access, lease-line and collocation. You can take your domain name, secured website and high- availability Web servers with this facility. Suppose a firewall is implemented with two separate Ethernet interfaces.

From Figure 4.1, the following explanation can be analysed as follows:

- The Ethernet eth0 connects to ISP1. The IP address of eth0 is 206.124.146.176 and ISP's gateway router has address as 206.124.146.254.
- The Ethernet eth1 connects to ISP2. The IP address of eth1 is 130.252.99.27 and ISP's gateway router has address as 130.252.99.254.
- The Ethernet eth2 connects to local LAN.

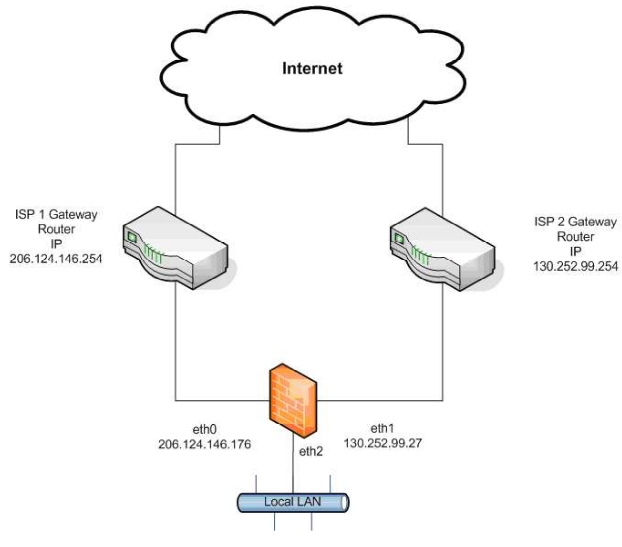


Fig. 4.1 *Connection between ISPs and the Internet*

Function of ISP

Commercial ISPs easily access and communicate with individual or various organizations across net. They are facilities-based carriers, for example, telephone and cable companies. The interconnected routers are assembled with ISP known as autonomous system (AS). ISP operates AS to information providers via Google and Yahoo search engines. They exchange traffic networking from other network. This process is called peering. The networks are connected to Internet Exchange (IX).

ISP interconnects with IX providing Tier-1 and other networks. The Tier-1 network provides the largest service with reference to ISP. Peering is settlement free therefore no money transaction is done between ISP and commercial business houses.

NOTES

4.3 WORLD WIDE WEB

The World Wide Web or WWW is a global hypertext system that was initially developed in 1989 by Tim Berners-Lee at the European Laboratory for Particle Physics, CERN, in Switzerland to facilitate an easy way of sharing and editing research documents among a geographically dispersed group of scientists.

The WWW has a unique combination of flexibility, portability and user friendly features that distinguish it from other features provided by the Internet.

Architecture of WWW

The architecture of WWW supports the interoperability design principle, assured by the implementation of compatible languages and protocols, and enables access, exchange and processing of information among agents. The evolution of the WWW technology supports maintainability and decentralization of information systems.

Functional Components of the World Wide Web

The World Wide Web is a complete system that is comprised of a number of related components, of which HTML (HyperText Markup Language), HTTP (HyperText Transfer Protocol) and URI (Uniform Resource Identifier) are most essential. HTML describes how hypertext documents are constructed. HTML allows links between documents to be represented while the HTTP is the application layer protocol that moves hypertext and other documents over the Web. The URI is a mechanism which provides a consistent means of identifying resources, both on the Web and more generally on the Internet.

The major functional components are HTML, HTTP, URIs, etc. of WWW.

Web Browsers

Web browsers are HTTP client software programs that run on TCP/IP client computers to access Web documents on Web servers. These browser programs retrieve hypertext documents and display them, and also implement many of the Web's advanced features, such as caching. Browsers used today support a wide variety of media, allowing the Web to implement many different functions aside from simply hypertext document transfer. Examples include displaying images, playing sounds and implementing interactive programs.

Web Servers

Web servers are computers that run special server software to allow them to provide hypertext documents and other files to clients who request them. Millions

of such machines around the world now serve as a virtual, distributed repository of the enormous wealth of information that the Web represents.

Working of WWW

NOTES

Following are the working phenomena of WWW:

- Viewing a Web page on the WWW normally begins either by typing the URL of the page into a Web browser or by following a hyperlink to that page or resource.
- First, the server name portion of the URL is resolved into an IP address using the global, distributed Internet database known as the domain name system.
- The browser then requests the resource by sending an HTTP request to the Web server at that particular address.
- The HTML text of the page is requested first and parsed immediately by the Web browser which will then make additional requests for images and any other files that form a part of the page.
- After receiving the required files from the Web server, the browser then renders the page onto the screen as specified by its HTML, Cascading Style Sheets or CSS and other Web languages. Any images and other resources are incorporated to produce the on-screen Web page that the user sees.

Hypertext is the main concept that makes the WWW more than just another message transfer system. The prefix 'hyper' usually means 'above' or 'beyond' and thus hypertext is like text, but goes beyond it in terms of functionality. The extra information in a hypertext document is used to tell the computer program that displays the file to a user how to format it. This information takes the form of special instructions that are interspersed with the actual text of the document itself which are written according to the syntax of a defining language. This addition of extra elements to the content of a document is commonly called *marking up* the document.

The WWW hypertext documents use *HyperText Markup Language (HTML)*. HTML documents are as American Standard Code for Information Interchange or ASCII text files, but are arranged using a special structure of HTML *elements* that define the different parts of the document and how they should be displayed to the user. Each element is described using special text *tags* that define it and its characteristics.

Web Documents

The documents in WWW can be grouped into three broad categories.

Static Documents

These are fixed content documents that are created and stored in a server. The client can only get a copy of the document. The contents of the file are determined when it is created and not when it is used. The user cannot change the document.

NOTES

Dynamic Documents

This document is created by the server whenever the browser requests the document. When a request arrives, the Web server runs an application program or a script that creates the dynamic document. The server returns the output of the program or script as response to browser that requested the document. A fresh document is created for each request; the contents of dynamic document can vary from one request to another for example, retrieval of date and time from a server.

There are two ways to create dynamic documents, which are as follows:

- Common Gateway Interface (CGI) is a technology that creates and handles dynamic documents. CGI is a set of standards that defines how a dynamic document is created, how data is input to the program and how output result is used.
- Scripting technologies are embedded in the HTML page.

  Example: PHP, JSP, ASP, etc.

Active Documents

In active documents the program or script runs at the client side. When a browser requests an active document, the server sends a copy of the document or script. The document is then run on the client side. Active documents are sometimes referred to as client-side dynamic documents.

Active documents can be created in two ways:

- Java applets, programs written in Java on the server are compiled and ready to run. The browser creates an instance of this applet and runs it.
- JavaScript is interpreted and run by the client at the same time. The script is in the source code.

4.4 PORTALS

The word 'portal' as defined by Janus Boye, is an IT solution which is being promoted by a range of vendors. This is a common point of communication over the net for the suppliers and buyers of e-commerce activities. The homepage of the company is a crucial component of E-commerce. All companies try to build a good landing page or home page which attracts the customer. The same could be

done by the company through external agencies or land page providers who generally use a responsive design. A responsive design is a strategy that automatically formats website content for the optimal viewing on any device.

NOTES

A few things to keep in mind as one designs as unique, website-friendly home page are as follows:

- It has to be remembered that the users are using their fingers to select items. Thus the pronounced image buttons have to have a single layout.
- The forms have to be kept to the minimal. The fields also should be fewer. One has to make the images re-sizable for different devices. One should also verify that the page is looking good vertically and horizontally.

Steps to Build a Homepage of a Website

There are many steps to creating a good website:

Page design

A has to be designed to accommodate the company's content. Web design is a broad term covering many different skills and disciplines that are used in the production and maintenance of websites. The major areas of web design entail the standardized code, web graphic design, user experience design, interface design, proprietary software, and search engine optimization. Web design describes the design process relating to the front-end (client side) design of a website that includes the writing mark up, along with the web development. Web designers need to have a awareness of usability and create a mark-up and need good knowledge of web accessibility guidelines.

Web pages have to be well laid out to improve navigation. The page layout has to be consistent on different pages. The page width for aligning objects and in layout design are also crucial. Most of the good websites have a width close to 1024 pixels. Most website pages are centre aligned, so that objects look aesthetically pleasing. Fluid layouts have replaced the HTML-table-based layouts. A design has to be broken down into units (content blocks, sidebars, navigation areas advert areas,) which are sent to the browser and are fitted into the display window by the browser.

Also needed is a good visual design on a website that is pleasant to the target market. The same could target a particular age group or strand of culture based on the trends of its audience. The designing is based on the type of business website, aesthetics or overall design, content, navigation and the capability for the users to find the desired information or products etc.

The page structure of the website will help organize the elements and ideas for the consumers. The structure of the website has to be decided based on the names of the navigation buttons and links among the various pages on the site. The company should have a logical and easy to follow navigation system so that the visitors can reach their desired page or content as quickly as possible.

Home Page: The home page is the first page most visitors will see. The same is also important in search engine rankings. The Home Page should give a clear summary of what a site is about, the products or services and instructions on how the visitors should utilize the facilities on the website. The home page should provide links to every page on the site

Contact Details: The web is an impersonal medium so that user should be able to easily contact the company via an email address or telephone number. In case an address is followed by the directions, maps, etc., then this could be helpful information on the website.

Enquiry Form: The site should have an online form at the top level of the navigation system. Thus the users can ask questions, give you feedback and send request quotations on the website.

Products & Services: The product or services pages will describe the offer. The website should be ecommerce-enabled site for the users to purchase products.

Information Pages: The information pages can ensure the content contains keyword-rich phrases for encouraging the search engines to return to the site. This information pages should have:

- Company Profile
- Frequently Asked Questions (FAQ's).
- Testimonials
- Case Studies
- Newsletters

4.4.1 Advantages of Portal

The major advantages of the company having its own portal are as follows:

Marketers use a portal for various marketing activities. Some of the activities which can be help in marketing through the portal of a company have been explained below:

1. Track and analyse web site traffic.

The traffic analysis data is crucial in measuring the effectiveness of the internet marketing techniques and the website performance. The same can be done through an Internet portal.

These bits of information available could help in managing traffic and judging how long visitors are staying on the website.

2. Upload links of companies related to your industry.

Adding links of related product could just add to the increasing the prestige of the business. For example, if a person visits the Asian paints website and the website

gives a link of the interior decorators or painter contractors, this could be an added advantage to the customers.

3. Informative articles and publications.

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The company could put on the website informational articles which could make a good image of the company in the eyes of the customers. Press releases and share prices rise could even help in the effective promotion of the company. These could reflect in the company's portal.

4. Miscellaneous activities like payments

Websites can also be used for miscellaneous activities like payments and queries. Some websites have an active chat on their website wherein the customers can speak to an executive of the company directly. Also payments through the net gives the customer's convenience thus making him or her more brand loyal. The portal of the company makes the same possible.

5. Option of buying or selling

Many a websites today display their product and offer online sales to the customers. The delivery would be at home and payments after delivery. Many lifestyle chains like Jabong.com which do not even have a physical presence are actually going for such marketing activities over the net. The company portal helps in the same.

4.4.2 Metadata

Metadata can be said to be the data which can give information about other data. There are many types of metadata which are present like descriptive metadata, structural metadata, administrative metadata, reference metadata and statistical metadata. Let us discuss each of them in turn:

- Descriptive metadata could be described as the resource for purposes like discovery and identification. This could also include elements like the title, author, and keywords.
- The structural metadata is a type of metadata which contains data and indicates how compound objects could be put together, like how many pages could be ordered to form chapters. There could be a description of types, relationships and many other factors for digital materials.
- Administrative metadata is a type of metadata which helps in providing information to help the resource management like when the same was created, the file type and information on who could access it.
- Reference metadata explains the contents and quality for any statistical data.
- Statistical metadata tells about the processes which are involved in collecting, processing, or producing statistical data; which is also called process data.

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4.4.3 Enterprise Information Portal (EIP)

The enterprise information portal (EIP) is also known as a business portal which becomes a single gateway for the company's information. This will also contain the knowledge base for employees and for customers, the company's business partners, etc. Thus the EIP is made up of the elements which help the company to access, collaborate, personalize and do an application integration for the portal.

An enterprise information portal could be said to be a framework which can be used to support and integrate the major processes, people and information which is available in an organization. The same gives a unified gateway that can be used for information and to provide knowledge base for partners, employees and customers of the company. The application interface which is provided by the EIP is also web-based .The same then provides an instant deployment, and ergonomics that could be user-friendly.

Integration and presentation could be said to be the main two functions for the EIP. An EIP will be able to extract information from multiple sources. It will then adjust the information in the portal.

The major features of an EIP because of which it is useful in E-commerce are as follows: Integration – EIP gives and integrated navigation gateway which can be used across multiple systems and components.

Customization- EIP gives the users an environment to customize.

Security and Control –EIP will fulfil the need to give limitation needed for specific contents and services. The EIP administrator could designate the access controls as and when they are needed by the firm.

Single sign-on – The EIP has capabilities for single sign-on which could be given to the users as well as the other systems.

Categorization and collaboration – The EIP helps in categorization of all information and thus also provides users to collaborate irrespective of their physical location.

Personalization – EIP can lead to personalization on the basis of the role and job function. The matching content which is used for the users is provided and the same is matched with relevant services used.

Check Your Progress

1. What is an autonomous system?
2. Who developed the World Wide Web?
3. List the various types of metadata.

4.5 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

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1. The interconnected routers are assembled with ISP known as autonomous system (AS). ISP operates AS to information providers via Google and Yahoo search engines.
2. The World Wide Web is a global hypertext system that was initially developed in 1989 by Tim Berners-Lee.
3. There are many types of metadata which are present like descriptive metadata, structural metadata, administrative metadata, reference metadata and statistical metadata.

4.6 SUMMARY

- Internet Service Provider (ISP) is a company that provides access to internet services. This service provider provides a software package in which you get registration with the providing services.
- The World Wide Web or WWW is a global hypertext system that was initially developed in 1989 by Tim Berners-Lee at the European Laboratory for Particle Physics and CERN.
- The World Wide Web is a complete system that is comprised of a number of related components, of which HTML (HyperText Markup Language), HTTP (HyperText Transfer Protocol) and URI (Uniform Resource Identifier) are most essential.
- HTML describes how hypertext documents are constructed.
- Web servers are computers that run special server software to allow them to provide hypertext documents and other files to clients who request them.
- The word 'portal' as defined by Janus Boye, is an IT solution which is being promoted by a range of vendors. This is a common point of communication over the net for the suppliers and buyers of e-commerce activities.
- The word 'portal' as defined by Janus Boye, is an IT solution which is being promoted by a range of vendors. This is a common point of communication over the net for the suppliers and buyers of e-commerce activities.
- The enterprise information portal (EIP) is also known as a business portal which becomes a single gateway for the company's information.

4.7 KEY WORDS

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- **Metadata:** It is a set of data that describes and gives information about other data
- **ISP:** It is a company that provides customers with Internet access.
- **Enterprise Information Portal**: It is a framework for integrating information, people and processes across organizational boundaries in a manner similar to the more general web portals.

4.8 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short-Answer Questions

1. What are the functions of an ISP?
2. Write a short note on the working of the World Wide Web.

Long-Answer Questions

1. Describe the advantages of portals.
2. Discuss the three categories of web documents.

4.9 FURTHER READINGS

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BLOCK - II
MODELS, PROTOCOL AND E-MARKETING

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UNIT 5 REFERENCE MODELS AND PROTOCOLS

Structure

5.0 INTRODUCTION

A network is made up of hardware and software. Network hardware includes transmission technologies. The networks are designed as a stack of consecutive layers which helps to provide services to the higher layers. The main responsibility of the network layer is to deal with the routing of packets to the intended destinations. To accomplish its task, the network layer extends its services to the transport layer. It offers both connection-oriented and connectionless service to the transport layer. The interaction between the network and transport layers is described in terms of the service provided to the transport layer. In this unit, you will learn in detail, the two important reference models including the Open System Interconnection (OSI) and the Transmission Control Protocol/Internet Protocol Reference Model.

To establish communication between two computers, a layer on one machine communicates with the layer on another using some rules and conventions, are known as layer on protocol. In this unit, you will be introduced several different

types of layers including the IP and Transmission Control Protocol, the DHFC, HTTP, FTP, POP and SMTP protocols.

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5.1 OBJECTIVES

After going through this unit, you will be able to:

- Discuss the concept of Open Systems Interconnection (OCI) model
- Explain the Transmission Control Protocol/ Internet Protocol model
- Examine the concept Internet protocol and Transmission Control protocol
- Describe the Dynamic Host Configuration Protocol and Hyper Text Transfer protocol
- Recall the concepts of File Transfer Protocol, Telnet, Post Office Protocol and Simple Mail Transfer Protocol

5.2 OSI MODEL

Computers in the early networks could typically communicate only with computers from the same manufacturer. For example, not possible to run both IBM solution and DECnet solution simultaneously. These could only be run one at a time. At the end of the 1970s, the Open System Interconnection (OSI) model was developed by the International Organization for Standardization (ISO) to break this barrier. The OSI model was designed to help the vendors create the standard network devices and is considered the primary architectural model for networks. It tends to describe the manner in which network and data information are communicated through the network media between applications of two computers. The OSI reference model breaks this approach into layers.

ISO developed the OSI model to help facilitate data transfer between network nodes. It is a conceptual blueprint of how communication should take place and addresses all the processes required for effective communication and divides these processes into logical groupings called layers. The concept of the OSI model is to separate networking operations into distinct levels in which each layer is responsible for performing a specific task or set of tasks, in addition to dealing with the layers above and below it. The OSI specifications attempt to assist the data transfer between disparate hosts, for example, data can be transferred between a UNIX host and a PC. OSI specifies a seven-layer model. In addition to forming the basis of the ongoing development of OSI's own protocols, it is used by the industry as the frame of reference when describing protocol architectures and functional characteristics. The ISO, in an effort to encourage open networks, developed an open systems interconnect reference model. The model logically groups the functions and sets rules, called protocols, necessary to establish and conduct communication between two or more parties. The model consists of seven functions, often referred to as seven conceptual layers, each assigned a ranking number from one to seven.

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The underlying principles and guidelines that were applied to arrive at the seven layers are given as follows:

1. Layers are created at different levels of abstraction.
2. Each layer is assigned to perform well-defined functions.
3. The function of each layer is based on internationally standardized protocols.
4. Layer boundaries are chosen to minimize the information flow across the interfaces.
5. The number of layers is kept large enough so that distinct functions have different layers. They are also kept small enough so that the architecture does not become unwieldy.

Layer Groupings

The seven layers of the OSI Model are categorized into two-layer groupings. The lower layers are Layers 1, 2, 3, and 4 and the upper layers are Layers 5, 6 and 7. The physical, data link, network and transport layers, which are the lower layers of the OSI model primarily deal with the formatting, encoding and transmission of data over the network without caring to know much about the data, its usage, etc. They define how data is transferred through a physical wire or through switches and routers and how to rebuild a data stream from a transmitting host to a destination host's application. The lower layers are implemented using both hardware and software with the incidence of hardware reducing to software from Layer 1 to Layer 4.

The top three layers define the way the applications within the end stations will communicate with each other and with users while the bottom four layers define how data is transmitted end-to-end. The higher layers of the model—the session, presentation and application layers primarily deal with user interface and implement the applications that run over the network irrespective of knowing how data is delivered from one place to another by the low-level layers. These layers are almost always implemented using software running on a computer or other hardware devices like routers, gateways, etc. The application layer along with other upper layers provides the user interface and applications communicating between hosts. The upper layers are not expected to know anything about networking or network addresses. The bottom four layers take the responsibility of networking and network addresses.

Some layers, like data and physical layers, are further divided into sublayers. These sublayers precisely define the internal details of technologies and protocols at those layers. Some OSI layers are related to each other. The data and physical link layers are considered closely related, and so are the network and transport layers, within the lower-level grouping. In case of the upper layers, the line dividing each layer from the other is so blurred that many technologies implement two or even all three of these layers.

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Key Concepts of OSI Models

- **OSI Interfaces:** The OSI interface is a process of communication between adjacent layers in which data is passed between layer N of the model and layer N-1 or layer N+1. The layer 3/4 interface is used by a Layer 3 and Layer 4 protocol to pass control and data information.
- **Vertical Communication:** This refers to communication up and down the protocol stack every time any data is sent or received across the network. This is because there exits only logical connections between corresponding layers of the OSI models of hosts machines, not actual physical connections. At the sending end, data passes through the higher layer to the physical layer so that it may be transmitted across the network to the receiving end. At the receiving end, the process is reversed so that the data can travel back up to the higher layers of the receiving device and to the user interface.
- **Modularity and Inter-Layer Interactions:** The OSI model supports the interconnection of different implementations of various autonomous layers. This is done through interfaces in which each layer should provide a consistent, well-documented interface to the layers above it so that any upper layer implementation can use the lower layer properly.
- **Protocols:** These are sets of agreed rules, procedures, instructions and/or functions describing one type of communication between specific software and hardware elements running at the same layer on different machines within a network. They have their own language. Some of them are similar to each other while others are quite unique.
- **Horizontal Communication:** Each layer in the OSI model has been assigned a set of tasks for which it is responsible and these tasks usually come under protocols defined for that particular layer. Horizontal communication defines that a process running at a particular layer on one host machine can accomplish logical communication with a similar process running at the same layer on another host machine. As both the host machines are only physically connected at the physical layer, therefore the data on the sending host machine needs to pass down through the layers between the higher layers to the physical layer. Thereafter, the data is transmitted through the transmission media to the physical layer of the other host machine and pushed up to the similar layer of the receiving host machine. In this manner, the two communicating hosts are logically connected at that particular layer.

For example, a protocol running at Layer 6 in the sending host machine passes down to Layer 1 of the same machine and is then transmitted over the transmission media to the Layer 1 of the receiving host machine. It is then pushed up to Layer 6 of the receiving host machine where a logical connection is established between Layer 6 of the sending host machine and Layer 6 of the receiving host machine. Thus, a protocol running at a particular layer in a host machine establishes a logical connection with a similar layer in another host machine. In fact, they have

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no physical connection at that layer. This is the horizontal connection that enables a protocol at a particular layer to perform its assigned job by creating a logical communication with the corresponding layer at the other side of the communicating host machine. However, the horizontal communication between similar layers also requires vertical communication, except in case of communication between Layers 6 and 1.

Protocol Data Units (PDUs): Protocols describe the rules to control horizontal communication for exchanging data between processes running at corresponding layers within the OSI model. Except Layer 1, all layers include their data in the message that is exchanged between corresponding software elements on two or more than two devices in the network. This additional data appended at each layer, except Layer 1, is mechanism for communicating information between protocols and is known as PDUs or Protocol Data Units. Each PDU is specified by a specific format that implements the requirements and features of the protocol.

Service Data Units (SDUs): The communication between corresponding layers except Layer 1 is logical communication. Here, a protocol communicates by passing down its PDU to the next lower layer for transmission. On the other hand, the lower layers provide services to the layers immediately above them. One example of such a service is to manage and handle data received from the layer above. A PDU is considered in itself as a complete message at a particular layer, say N. When this layer N PDU is passed down to layer N-1, it becomes the data for the layer N-1 and the protocol for layer N-1 is expected to provide service. Thus, the layer N PDU becomes the Service Data Unit (SDU) for the layer N-1. Sometimes, SDU is also called or the message body or payload.

Data Encapsulation: N PDU, when transported to the N-1 layer, becomes N SDU for the N-1 layer. The layer N-1 transports N SDU to the next lower layer by placing the layer N SDU into its own PDU format. This process is known as data encapsulation in which the entire message including SDUs of higher layers are encapsulated as the data payload of the message at the lower layer. This process continues till the message reaches the physical layer.

Layers in OSI Model

The OSI reference model has the following seven layers:

1. Application layer
2. Presentation layer
3. Session layer
4. Transport layer
5. Network layer
6. Data link layer
7. Physical layer

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Let's discuss their functions in detail.

Physical Layer (Layer 1)

Layer 1 of the OSI model is a physical layer and it supports serialization of the frame in which the frames are converted into a series of bits so that they may be transmitted across a transmission media to the destination or towards destination through an intermediate system. A number of transmission media exist. Some of the popular transmission media are: open wire circuits, twisted pair cables, coaxial cables, fiber optic cables, wireless, etc. The physical layer specifies the representation of each bit as a voltage, current, phase or frequency. It basically uses four types of bit signalling approaches. They are RZ (Return to Zero) using pulse signaling, NRZ (Non Return to Zero) transmission using level signaling and Manchester encoding using phase signalling. The series of bits are reassembled at the receiving end to form a frame, which is forwarded to the data link layer for further processing. This is performed with the help of a clock to generate bit-timing signal. The timing signal identifies the boundaries between the bits. Asynchronous communication and synchronous communication are two types of systems used to provide timing signal.

Briefly, the physical layer describes the physical media or communication channel over which the bit stream is to be transmitted with the objective that when the sending side sends 1 bit, it is received by the receiving side as 1 bit, not as 0 bit. Hence, it defines the electrical and mechanical aspects of interfacing to a physical medium for transmitting data, as well as setting up, maintaining, and disconnecting physical links. It is primarily concerned with moving bits from one node to the next over the physical link. The issues concerned with the physical layer involve amplitude of the pulses to define 1 and 0 level, width of the pulse in microseconds, types and mode of communication, establishment and breaking of connections at the time of communication, types of connectors, etc. Basically, the physical layer transforms bits in a computer system into electromagnetic signals for a particular transmission medium like wire, fibre, etc. The physical layer functions are as follows:

- **Describing Hardware Specifications:** It includes specifications of cables, connectors, radio transceivers, network interface cards, etc.
- **Encoding and Signalling:** The physical layer supports various encoding and signalling functions to convert data, from bit stream to frame and vice versa, to send across the network.
- **Data Transmission and Reception:** It is responsible for transmitting and receiving data over the physical media.

The physical layer accepts data from the Data Link layer in bit streams for the subsequent transmission over the physical medium. At this layer, the mechanical (connector type), electrical (voltage levels), functional (ping assignments), and procedural (handshake) characteristics are defined. RS-232C/D is an example of a physical layer definition.

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Data Link Layer (Layer 2)

The data link layer is Layer 2 of the OSI model and provides functional and procedural means to exchange data between network entities. The set of devices functioning at the data link layer simply supports the functionalities of networking instead of internetworking. Sometimes, the data link layer is also known as the link layer because it provides links to many wireless and wired Local Area Networking (LAN) technologies like Ethernet, FDDI, IEEE 802.11, etc., to function. It tends to correct transmission errors and support the deactivation, maintenance and activation of data link connections. It also groups bits into message frames and characters, and provides character and flow control, frame synchronization, media access control and error control. Some of the examples of data link layers are HDLC and Ethernet.

It takes the bits received by the physical layers; detects error; ensures that messages are delivered to the proper devices; and translates messages from the network layer into bits for the physical layer to transmit. The data link layer transforms a stream of raw bits (0s and 1s) into a data frame and provides an error-free transfer from one host to another and allows the layers above it to assume virtually error-free transmission. This establishes an error-free communication path between network nodes over the physical channel, frames messages for transmission, checks the integrity of received messages, manages access to and use of the channel and ensures proper sequence of transmitted data. Hence, this layer is responsible for the reliable transfer of data across the physical link. Its responsibilities include functions, such as data flow control, breaking the input data, frame formatting, transmission of the frames sequentially, error detection, and link management, etc. In order to provide a reliable service, it also offers processing of the acknowledgement frames, retransmitting of lost or damaged frames, etc. The data link layer is conceptually subdivided into the Logical Link Control and Medium Access Control (MAC) sublayers to deal with the access control over the shared channel in broadcast networks. The key functions of the data link layer are summarized as follows:

- **Logical Link Control (LLC):** LLC refers to one of the sublayers of the data link layer and deals with the functions that enable control and establishment of logical links between local devices on a computer network. LLC has also been given the responsibility to provide services to the network layer above it and hides the rest of the details of the data link layer to allow different technologies to work seamlessly with the higher layers. Most of the local area networking technologies use the IEEE 802.2 LLC protocol.
- **Media Access Control (MAC):** MAC refers to one of the sublayers of the data link layer and specifies the procedures used by devices to control access to the network medium. Its role is to control and manage the medium to avoid conflicts because the design of a computer network is based on the shared medium that may be composed of a single network cable or a

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series of cables that are electrically connected to a single virtual medium. Some of the examples of MAC are CSMA/CD for Ethernet and token passing for the Token Ring network.

- **Data Framing:** Messages of higher layer are encapsulated at this layer into frames so that they may be sent across the network at the physical layer.
- **Addressing:** The data link layer also deals with the issue of addressing which is popularly known as hardware address or MAC address in which the information is labelled with a particular destination location. Each device on a network is provided with a unique number called a hardware address or MAC address, which is used by the data link layer protocol to ensure that the data intended for a specific machine gets to it properly.
- **Error Detection and Handling:** The data link layer also deals with errors that occur at the lower levels of the network stack. For example, a Cyclic Redundancy Check (CRC) field is often used to allow the host receiving data to detect if it was received correctly.

Network Layer (Layer 3)

If the data link layer intends to define specifications for the computer networking network, then it is the network layer that specifies how internetworks (Internet) function. The network layer is the first layer in the OSI model that deals with the actual obtaining of data from computers even if they are on a remote network. While the data link layer is only concerned with devices that are situated on the same network or local to each other. The key functions of the network layer are as follows:

- **Logical Addressing:** The devices communicating across a network have logical addresses which are known as layer three addresses. Internet Protocol (IP) is an example of Layer 3 addressing. Unlike, data link addressing that deals only with local physical devices, the logical addresses at Layer 3 are independent of particular hardware and unique across an entire internetwork.
- **Routing:** It is the key function of Layer 3 in which data is routed across interconnected networks to deliver finally at the host destination. This is accomplished with the help of devices like routers and software routines that function at the network layer to handle incoming packets from various sources and determine routes for their final destination so that they could be delivered reliably there.
- **Datagram Encapsulation:** The network layer functions to encapsulate messages received from higher layers by placing them into datagrams with a network layer header. Datagrams are also referred to as packets.
- **Fragmentation and Reassembly:** The network layer passes down messages to the data link layer for transmission through the physical layer

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over the transmission media to other networks or the local network. The network layer also splits large packets into smaller packets according to the limits imposed on the length of the packet by the data link layer. This process is called fragmentation. Thus, the fragmented pieces are put together at the network layer of the destination machine. This process is called the reassembly of packets.

Transport Layer (Layer 4)

The basic role of the transport layer is to transport data but involves high-level functions as compared to the same functions delivered by the lower layers. The Layers 1, 2 and 3 primarily deal with the packaging, addressing, routing and delivery of data; and the Layer 4 acts as an interface between the applications at the higher layers and the functions of Layers 1 to 3. Thus, the transport layer provides the necessary functions to enable communication between software application processes on different computers.

The transport layer accepts data from the session layer and splits it up into smaller units so that it can be passed to the network layer; and ensures that the all pieces arrive correctly at the other end. Thus, this layer guarantees the orderly and reliable delivery of data between end systems after accepting data from the session layer. Data is accepted from the session layer and split up into smaller units, if needed. The session layer passes the data to the network layer and ensures that the packets arrive correctly at the receiving side. The transport layer establishes a distinct network connection for each transport connection required by the session layer. Basically, it performs connection management based upon throughput conditions. In normal condition, one network connection corresponds to multiple transport connections. In high throughput condition, one transport connection corresponds to multiple network connections. The most popular protocol suite TCP/IP uses this layer. The transport layer also performs additional functions, such as data multiplexing and de-multiplexing. This layer divides up a transmitting message into packets and reassembles it at the receiving end. Service offered at this layer includes an error-free point-to-point channel to deliver messages in the order in which they were sent. The transport layer is a true source-to-destination or end-to-end layer. Flow control between hosts is also needed but is different from the flow control between routers (similar principles will apply to both). Some important functions of the transport layer are as follows:

- **Process-Level Addressing:** Like Layers 2 and 3, the transport layer also deals with the addressing issue but quite differently in which it is used to differentiate between software programs or different applications. This function of the transport layer enables many different software programs or applications to use a network layer protocol simultaneously.
- **Multiplexing and Demultiplexing:** It enables a sending device to multiplex the data received from many application programs for transport, and demultiplex the data received while acting as the receiving side.

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- **Segmentation, Packaging and Reassembly:** According to the specified limit on the length of the data packet at the network layer, the transport layer (like network layer) segments the large amounts of data into smaller pieces on the source machine to transmit across the network and then reassemble them on the destination machine.
- **Connection Establishment, Management and Termination:** The connection-oriented protocols at the transport layer establish a connection, maintain it as data is sent over it and then terminate the connection when it is no longer required for the series of communications.
- **Acknowledgments and Retransmissions:** The transport layer ensures guaranteed delivery of data reliably which is accomplished by using a variety of techniques, most commonly the combination of acknowledgments and retransmission of data if data is not delivered successfully.
- **Flow Control:** It refers to the process of specifying that the data rate of the sending device should not be prohibitively excessive so that the receiver could be saved from being bogged down with data. In other words, this function manages mismatches in speed between the sender and the receiver.

Session Layer (Layer 5)

The session layer is the lowest of the three upper layers and deals mainly with software application issues only. It helps enable devices to establish and manage sessions. Primarily, a session is a persistent logical linking of two software application processes to exchange data over a specified period of time. The session layer is responsible for establishing, maintaining, and arbitrating the dialogs between communicating applications. It also provides enhanced services useful in some applications, for example, remote login, remote file transfer, etc. It is also responsible for orderly recovery from failures by implementing appropriate checkpointing mechanisms. The applications on either side of the session can exchange data or send packets to another for as long as the session lasts. The session layer handles session setup, message exchanges and it terminates when the session ends. It also coordinates and monitors session identification so that only designated parties can participate. It also provides security services to control access to session information. The session layer allows hosts to establish session between them in which ordinary data transport is allowed. The session layer also manages dialogue control.

Establish, Manage and Terminate Sessions: The primary task of session layer protocols is to provide the necessary ways to establish, manage and terminate sessions. These session layer protocols are usually provided to higher layer protocols through command sets often known as the application program interfaces or APIs. Some of the common examples of APIs are NetBIOS, TCP/IP sockets, Remote Procedure Calls (RPCs), etc. The APIs enable an application to complete specified high-level communications over the network successfully and easily with the help of a standardized set of services.

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Presentation Layer (Layer 6)

The presentation layer is concerned with the presentation of data where it supports any special processing on the data from the time an application attempts to send it till the time it is sent over the network. Thus, it is responsible for any issues that may arise where data sent from one system needs to be viewed in a different way by the other system. The presentation layer performs functions related to the syntax and semantics of the information transmitted. This includes formatting and displaying of received data by terminals and printers. It is concerned with differences in the data syntax used by communicating applications. This layer is responsible for remedying those differences by resorting to mechanisms that transform the local syntax (specific to the platform in question) to a common one for the purpose of data exchange. For example, it performs encoding of data in a standard, agreed-upon way to facilitate information exchange among heterogeneous systems using different codes for strings, for example, conversion between ASCII and EBCDIC character codes. It facilitates data compression for reducing the number of bits to be transmitted and encrypts data for privacy and authentication, if necessary. Some of the specific types of data handling issues that the presentation layer provides are as follows:

- **Translation:** Different types of computers like PCs, Macintoshes, UNIX systems, AS/400 servers, etc., in an internetwork have many distinct characteristics and represent data in different ways. It is the responsibility of the presentation layer to hide these differences between different machines for seamless and easy exchange of data between two hosts working on different machines. The translation function is sometimes not needed.
- **Compression:** Compression and decompression are also carried out at the presentation layer to improve the throughput of data. However, these functions are optional.
- **Encryption:** Some types of encryption and decryption are performed at the presentation layer to ensure the security of the data as it passes down the protocol stack. These are also optional.

Sometimes, the presentation layer functions are taken care of by the application layer and the functions like translation, compression/decompression and encryption/decryption are not always required. Due to these facts, the presentation layer is often skipped in actual protocol stack implementations; and it is possible for Layer 7 to directly talk to Layer 5 in the OSI model.

Application Layer (Layer 7)

The application layer provides support services for user and application tasks which are programs that actually implement the functions performed by users to accomplish various tasks over the network. It determines how the user will use the data network. It allows the user to use the network. For example, it provides network-based services to the end-user. Examples of network services are

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distributed databases, electronic mail, resource sharing, file transfers, remote file access and network management. This layer defines the nature of the task to be performed. The application layer provides user interface to communicate with the computer. It identifies and establishes the availability of the intended communicating host and determines if sufficient resources for the intended communication exist. The application layer provides a variety of protocols that are commonly needed. Some of the characteristics of the application layer are to provide an end-user interface for human machine interface so that the necessary commands may be entered to obtain the necessary application. Some of the most popular application layer protocols are HTTP, FTP, SMTP, DHCP, NFS, Telnet, SNMP, POP3, NNTP and IRC.

Check Your Progress

1. Who developed the OSI model to help facilitate data transfer between network nodes?
2. What does the first two layers of the OSI model deal with?
3. Mention some examples of the data link layers.
4. Name the layer of OSI model which is responsible for establishing, maintaining, and arbitrating the dialogs between communicating applications.

5.3 TCP/IP REFERENCE MODEL

The TCP/IP model is considered the oldest protocol of all computer networks like the ARPANET and its successor, the Internet. It contains two protocols TCP and IP. TCP stands for Transmission Control Protocol and IP for Internet Protocol. The TCP/IP protocol suite that came before the OSI reference model is another layered networking model attempts to divide jobs into layers and components. It was developed with the objective to specify a suite of protocols capable of providing transparent communications interoperability services between computers of all sizes, regardless of the hardware or operating system platforms supporting them. Over the years, TCP/IP has become the most widespread of protocols. One reason for TCP/IP's popularity is the public availability of its protocols' specifications. In this sense, TCP/IP can justifiably be considered an open system. Most users rely on TCP/IP for the purpose of file transfers, electronic mail (e-mail), and remote login services. The TCP/IP model was aimed to connect multiple networks together in a seamless way even in case of breakdown of the subnet hardware. They not only provide seamless communication, but also provide a flexible architecture that should support applications with divergent requirements, ranging from transferring files to real-time speech transmission. These objectives could be achieved because of the inclusion of the research work on packet-switching network to the ARPANET.

Correspondence Between the OSI and TCP/IP Models

The TCP/IP and the OSI models are quite similar even if they do not exhibit network functionality in precisely the same way.

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The TCP/IP model is composed of four layers which are logically considered equivalent to the top six layers of the OSI reference model. Figure 5.1 shows the layers of TCP/IP and OSI reference models.

	OSI Model		TCP/IP Model	
7	Application layer			
6	Presentation layer		Application layer	4
5	Session layer			
4	Transport layer		(Host to Host) Transport layer	3
3	Network layer		Internet	2
2	Data link layer		Network Interface	1
1	Physical layer		Hardware	

Fig. 5.1 *Correspondence between OSI and TCP/IP Models*

The TCP/IP model does specify the physical layer because the data link layer acts as the point at which the interface occurs between the TCP/IP stack and the underlying networking hardware. Host-to-host interface using TCP corresponds to the fourth layer of OSI reference model. IP corresponds to the third layer of the same model. TCP provides a connection type service. That is, a logical connection must be established prior to communication to continuously transmit large amount of data with acknowledgement. IP is a connectionless type service and prior to transmission of data, no logical connection is needed. TCP/IP defines a suite of communication and application protocols in layer structure, with each layer handling distinct communication services. TCP/IP defines a four-layer model consisting of the Internet layer, the transport layer, the application layer and the network interface layer. This architecture is based on three sets of interdependent processes, namely, application-specific processes, host-specific processes and network-specific processes.

1. Network Interface Layer

This layer is controversial and some people do not consider it as the part of the TCP/IP suite because none of the core IP protocols run at this layer. Therefore, this layer below the Internet layer is not defined and varies from host to host and

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network to network. The TCP/IP model suggests that the host has to connect to the network using some protocol so it can send IP packets over it. This layer enables the TCP/IP protocols running at higher layers to get interfaced to the local network. This layer corresponds to the data link layer of the OSI model and is also sometimes known as the link layer. The TCP/IP standards like Serial Line Internet Protocol (SLIP) and the Point-to-Point Protocol (PPP) define protocols for TCP/IP networks for Layer 2 implementation, to fill the gap between the network layer and the physical layer.

2. Internet Layer

This layer matches with the network layer of the OSI model and supports layer three jobs like logical device addressing, data packaging, manipulation and delivery, routing, etc. The packet format and protocol at this layer is called Internet Protocol (IP). IP is a connectionless type service that introduces IP packets into any network. The packets travel independently to the destination. Prior to transmission of data, no logical connection is needed. The TCP/IP Internet layer corresponds to the network layer of the OSI reference model in functionality. Other support protocols like ICMP or Internet Control Message Protocol and the routing protocols, such as RIP, OSFP, BGP, etc., are found at this layer.

3. Transport Layer (Host-to-Host)

The transport layer of the TCP/IP model corresponds to the transport layer of the OSI reference model. The primary job of this layer is to support end-to-end communication over an internetwork. It is represented by two end-to-end protocols namely, TCP (Transmission Control Protocol) and UDP (User Datagram Protocol) and therefore allows logical connections to be made between communicating devices to enable data to be transmitted either unreliably or reliably. TCP is a reliable connection-oriented protocol and UDP is an unreliable connectionless protocol.

4. Application Layer

The TCP/IP model was the first of its kind, and therefore, did not contain session or presentation layers because of its little use to most of the applications. This layer has all the higher-level protocols, as shown in Figures 5.4 and 5.5. Numerous protocols are found at the application layer. They are application protocols like HTTP, FTP, SMTP, etc., for providing end-user services, as well as administrative protocols like SNMP, DHCP, DNS, etc.

Data Encapsulation in TCP/IP

The data encapsulation in the TCP/IP protocol suite similar to the OSI model. The TCP operates at Layer 4 of the OSI model and passes down the message known as segments containing data encapsulated from higher-layer protocols. The layer below TCP is the IP at Layer 3 which receives data from TCP and encapsulates it for transmission. According to the OSI reference model, TCP segments are created as Layer 4 PDUs which becomes Layer 3 SDUs at IP layer. The IP software

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encapsulates these SDUs into messages known as IP packets or IP datagrams which is now treated as the Layer 3 PDUs. When Layer 3 PDUs passes down to a Layer 2 protocol, for example, Ethernet, which treats IP datagrams as Layer 2 SDUs and encapsulates them into Layer 2 PDUs which is called Ethernet frames and are passed down to Layer 1. At the receiving end, the process of encapsulation is reversed.

TCP Layer

It provides a connection type service. That is, a logical connection must be established prior to communication. Because of this, a continuous transmission of a large amount of data is possible. It ensures a highly reliable data transmission for upper layers using IP protocol. This is possible because TCP uses positive acknowledgement to confirm the sender about the proper reception of data. The sender keeps on sending data at constant intervals until it receives a positive acknowledgement.

A negative acknowledgment implies that the failed data segment needs to be retransmitted.

What happens when a packet is lost on the network and fails to reach its ultimate destination? When Host A sends data, it starts a time down counter. If the timer expires without receiving an acknowledgment, Host A assumes that the data segment was lost. Consequently, the sending computer retransmits a duplicate of the failing segment.

Its other functions include sequence control, error recovery and control, flow control and identification of port number.

The TCP header includes both source and destination port fields for identifying the applications for which the connection is established. The sequence and acknowledgment number fields underlie the positive acknowledgment and retransmission technique. Integrity checks are accommodated using the checksum field.

Application Layer

Application layer functions are to identify the source and destination machines that wish to communicate with one another; find out resource availability to and synchronize exchange of data between source and destination machines. However, each application is different but some applications are so useful that they have become standardized. To identify source and destination machines wishing to exchange data, the application layer finds out the identity and availability of source and destination machines for an application with data to send. To determine resource availability, the application layer decides if sufficient network resources for the requested exchange of data are available. In order to synchronize the exchange of data, the application layer provides the necessary support.

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Check Your Progress

5. What was the objective with which the TCP/IP protocol suite was developed?
6. In which layer of the TCP/IP model are the Internet Control Message Protocol and routing protocols found?

5.4 TRANSMISSION CONTROL PROTOCOL (TCP)

The transport protocols are independent of the underlying network layer technology. Transmission Control Protocol (TCP) does not consider where IP runs over fibre or over radio. But in network era most TCP implementations have been carefully optimized which are true for wired networks but that fail for wireless network. TCP implementation is needed to wireless transmission logically due to slow performance. The congestion control algorithm is considered as principle problem. TCP implementations assume that timeouts are caused by congestion but not by lost packets. When a timer goes off TCP slows down and sends less vigorously. For this, Jacobson's slow out algorithm is used. In 1998, Van Jacobson published a paper 'Congestion Avoidance and Control in Proceedings ACM SIGCOMM 88' which outlines a technique for responding to congestion by reducing the amount of data sent by the sender. In Jacobson's slow start algorithm, TCP keeps track of a second limit which is known as congestion Window size. The real Window size is smaller than the congestion Window size and TCP receiver Window size by the following pseudocode in which two parameters, such as congestion window size and TCP window size have been used.

```
    Actual window size = min {congestion window size, TCP window
size}
```

The idea behind implementation of wireless TCP is to reduce the network load and thus alleviate the congestion. Wireless TCP is being used between mobile host and access point, i.e., foreign agent. PC is connected with standard TCP via the wired Internet.

Wireless transmission links are highly unreliable. They lose packets all the time, for example, 20 per cent of all packets are lost if the sender transmits 100 packets/sec then the throughput is 80 packets/sec. If sender slows down to 50 packets/sec then the throughput drops to 40 packets/sec. A solution was proposed by Bakne and Badrinath which is called indirect TCP introduced in year 1995 which is used to split the TCP connection into two different connections. The first connection goes from the sender base station. The second one goes from the base station to the receiver. The base station copies packets between the connections in both the direction which are considered as homogeneous.

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Timeouts on the first connection slows down the sender down but timeouts on the second one can speed it up. The major features of wireless TCP are as follows:

- TCP is a connection based protocol which first prepares a setup before transferring of data.
- It facilitates acknowledgements which performs safe receipt of packets.
- TCP detects duplicate, missing and corrupted packets. It has good relative throughput on modem and LAN.
- It maintains sequence numbers which reassembles the data packets in which they were sent earlier.
- TCP data packets follows stream from application side.
- TCP is used for Telecommunication Network (Telnet), File Transfer Protocol (FTP), HyperText Transfer Protocol (HTTP), Simple Mail Transfer Protocol (SMTP).
- TCP maintains data order which means if 5 data packets are sent to destination then data packet 1 is received before data packet 2.
- Routing in wireless networking always take notice about TCP packets. If they are not transmitted in an order and without duplication, TCP buffers and retransmits them.
- It has a few socket options which tolerate the built-in control. But it has no block boundaries and cannot be used in broadcast or multicast transmission. It transfers servers which maintain a separate socket and separate thread for each client.
- It uses four algorithms which provide congestion control, congestion avoidance, and slow start, fast retransmit and fast recovery. Losing packets shows the indication of congestion. It also checks the availability of bandwidth and changes delayed on the link which solves the loopholes with the help of above algorithms.
- TCP issues a process for Web browser. In this process, browser sends data, such as Uniform Resource Locator (URL) to a destination host, such as Web server. TCP creates an initial segment. Segment connects the sender (browser) and receiver (server). They change IP address and port numbers to create socket interface and setup flow control and sequencing methods.

The TCP has been widely and frequently used in today's Internet. The protocol supports reliable data transport by establishing a connection between the transmitting and receiving ends. The transmitter starts a timeout mechanism when a packet is sent to the receiver. The transmitter constantly tracks the Round Trip Times (RTTs) for its packets as a mean to determine the appropriate timeout period. At the receiver, each received packet is acknowledged implicitly or explicitly to the transmitter. If the transmitter does not receive an acknowledgement for a given packet when the corresponding timeout period expires then the packet is deemed to be lost and subjected to retransmission. A congestion Window with dynamically

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adjusted size is used by the protocol to regulate the traffic flow from the transmitter to the receiver. Although TCP was initially designed and optimized for wired networks the growing popularity of wireless data applications lead third generation wireless networks, such as Code Division Multiple Access (CDMA) 2000 and Universal Mobile Telecommunications System (UMTS) networks to extend TCP to wireless communications as well. The initial objective of TCP is to efficiently use the available bandwidth in the network, to avoid overloading the network and the resulting packet losses by appropriately throttling the sender's transmission rates. Network congestion is deemed to be the underlying reason for packet losses. Similarly, TCP performance is often unsatisfactory when used in wireless networks and requires various improvement techniques. A key factor causing the unsatisfactory performance is that the radio link quality in wireless networks can fluctuate greatly in time due to channel fading and user mobility which leads to a high variability of transmission time and delay. High delay variability is also due to possible with retransmission process at the link level and use of opportunistic schedulers that give preferential service to terminals with fast radio links thus causing an additional delay to terminals with relatively poor radio quality. Large delay variability can be incurred during handoff from one cell to a neighboring cell. A form of high delay variability referred to as delay spike is a sudden and drastic increase in delay for a particular packet or a few consecutive packets relative to the delay for the preceding and following packets. When TCP is employed for data transport in such environments which are highly variable RTTs and delay spikes can induce spurious timeouts although the involved packet actually is not lost but simply delayed. Regardless of the actual cause when a timeout occurs the TCP congestion Window is reduced to 1 thus throughput is unnecessarily degraded. Despite of TCP improvement in wireless networks it is not easy to identify a technique which could be viewed as universally suitable for a wide variety of network and application environments. For example, methods of the first group require modifications to TCP entities may not readily be adopted because of non-compliance with existing protocol standards. In addition, TCP performance for the connection between the terminal and the proxy which includes a radio link may not be satisfactory and can be further improved. Finally, the delay jitter algorithm requires appropriate selections of control parameters to minimize the negative performance impacts due to the increase of RTTs.

TCP uses Selective Repeat (SR) process as its retransmission policy in case of timeout. When the timeout for an outstanding packet occurs the TCP sender retransmits only that packet to the receiver. Another policy is known as the Go-Back-N (GBN) policy. Under the GBN policy, when a timeout occurs basically on the unacknowledged packet that was sent at the earliest time the sender resends all unacknowledged packets including the packet that caused the timeout. Depending on factors, such as packet loss characteristics and bandwidth delay product either the SR or GBN policies yield better throughput performance. For example, when packets are lost randomly the loss of a particular packet does not imply loss of previous or subsequent packets. In that case, the GBN policy

will waste bandwidth and incur extra delay to retransmit all outstanding packets, even when one single packet is lost. In this case, the SR policy often performs better than the GBN policy.

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5.5 INTERNET PROTOCOL (IP)

In contrast to TCP, IP protocol is a connectionless type service, which operates at the third layer of OSI reference model, that is, prior to transmission of data, no logical connection is needed. This type of protocol is appropriate for the sporadic transmission of data to a number of destinations. Though it does not have functions such as sequence control, error recovery and control, and flow control, it identifies the connection with port number. The IP datagram has a header of 20-byte fixed size and a text of variable length optional parts. The header format is transmitted from left to right and the high order bit of Version field is transmitted first.

Data encapsulation adds the IP header to the data. The IP header consists of five or six 32-bit words and the sixth word is attributed to the IP options field. The different fields of the IP header are given as folows:

- **Version:** It refers to the version of the IP protocol in use and it keeps a track of the version of the protocol to which the datagram belongs. The current version of IP is 4.
- **Internet Header Length (IHL)**: It indicates the length of the header field in 32-bit words. The minimum value of the header field is 5, which is applied when no option is present. The maximum value of this 4 bit field is 15 which restricts the header to 60 bytes and Option field to 40 bytes.
- Types of services enable the host to instruct the subnet about the kind of services (e.g., reliability and speed) it requires. It refers to all types of services that IP supports. The desired service type is normally specified by user level applications. Examples of service types include minimum and maximum throughput which is requested by applications such as the File Transfer Protocol (FTP) and Simple Mail Transfer Protocol (SMTP).
- The total length has everything in the datagram (max. 64 KB). If it is subtracted from the IHL field, it indicates the actual length of the data field to IP.
- Identification enables the destination host to determine that a newly arrived fragment belongs to a particular datagram.
- DF connotes Do not Fragment.
- MF connotes More Fragments.
- Fragment offset indicates the source location of the current datagram. The elementary fragment unit size is 8 bytes.
- Time To Live or TTL that counts hops is expressed in seconds. A zero count indicates that the packet is discarded. TTL is employed by IP to

prevent a lost datagram from endlessly looping around the network. IP achieves this objective by initializing the TTL field to the maximum number of routers that the packet can traverse on the network. Every time the datagram traverses a router, the IP decrements the TTL field by 1.

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- Protocol indicates the destination which transports process to give the datagram to TCP, UDP, or others.
- Header checksum verifies the header only. The algorithm is to add up all the 16-bit half words as they arrive, using the complement arithmetic.
- Source/Destination address intimates the network number and the host number.
- Options provide an escape to allow subsequent versions of the protocol to have access to the information not present in the original design, to allow experimenters to try out new ideas, and also to avoid allocating header bits to information that is rarely needed. In its presence, it includes optional control information. An example of optional information includes the route record, which entails a record of every router that the datagram traversed during its trip around the network.

5.6 USER DATAGRAM PROTOCOL (UDP)

User Datagram Protocol (UDP) enables application programs to have direct control to a datagram delivery service similar to the delivery service that IP provides. This enables applications to inter change messages over the network with least protocol overhead. UDP is a connectionless unreliable datagram protocol in which the sending terminal does not check whether data has been received by the receiving terminal. The unreliable service indicates that there is no guarantee that the data reaches the receiving end of the network without any error.

However, this protocol makes it possible to omit a variety of processes, thus reducing the load on the CPU. UDP has 16-bit *Source Port* and *Destination Port* numbers.

The following is a brief description of each field:

- **Source Port:** Source port specifies port number of the application relating to the user data.
- **Destination Port:** This pertains to the destination application.
- **Length:** It explains the total length of the UDP datagram, that includes both data and header information.
- **UDP Checksum:** It gives an option of integrity checking.

At this point, it is important to understand the layering concept along with the need for headers.

There are a number of good reasons for choosing UDP as a data transport service. When the transmitted data is small, UDP is believed to be the best choice

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for a transport layer protocol because the overhead for establishing links and ensuring reliable delivery is greater than the work of retransmitting the entire data. Applications for a query response model also work excellently for using UDP. The response is considered as a positive acknowledgement to the query. When a response is not received within a certain time period, the application initiates another query.

Some examples of the usage of UDP are remote file server using Network File System or NFS, name translation using Domain Name System or DNS, intra-domain routing using Routing Information Protocol or RIP, network management using Simple Network Management Protocol or SNMP, multimedia applications and telephony.

5.7 DYNAMIC HOST CONFIGURATION PROTOCOL (DHCP)

DHCP (Dynamic Host Configuration Protocol) is a communications protocol that lets network administrators centrally manage and automate the assignment of Internet Protocol (IP) addresses in an organization's network. Using the Internet Protocol, each machine that can connect to the Internet needs a unique IP address, which is assigned when an Internet connection is created for a specific computer. Without DHCP, the IP address must be entered manually at each computer in an organization and a new IP address must be entered each time a computer moves to a new location on the network. DHCP lets a network administrator supervise and distribute IP addresses from a central point and automatically sends a new IP address when a computer is plugged into a different place in the network.

DHCP uses the concept of a "lease" or amount of time that a given IP address will be valid for a computer. The lease time can vary depending on how long a user is likely to require the Internet connection at a particular location. It's especially useful in education and other environments where users change frequently. Using very short leases, DHCP can dynamically reconfigure networks in which there are more computers than there are available IP addresses. The protocol also supports static addresses for computers that need a permanent IP address, such as Web servers.

DHCP is an extension of an earlier network IP management protocol, Bootstrap Protocol (BOOTP). DHCP is a more advanced protocol, but both configuration management protocols are commonly used and DHCP can handle BOOTP client requests. Some organizations use both protocols, but understanding how and when to use them in the same organization is important. Some operating systems, including Windows NT/2000, come with DHCP servers. A DHCP or BOOTP client is a program that is located in (and perhaps downloaded to) each computer so that it can be configured.

5.8 HYPERTEXT TRANSFER PROTOCOL (HTTP)

In order to access any Website, the Web browsers are used, which are assisted by the URL that uses the HTTP scheme. It is the URL or the port number that assists the browser to link with a Website. The server indicates a computer connected to the Internet, while the port number indicates a type of socket to which the browser plugs in to link with the Web server. The Web server not only provides the requisite Web pages but also describes a computer program that runs on a computer to provide Web pages. When a browser receives an URL, it will attempt to connect with the server computer having the required Web pages by connecting to the specified port number. The URL can be provided to the browser either by typing it at its specified location or by clicking on the link available on some already displayed Web page or document.

It is the role of the browser to connect with the server where the requisite requests from a client or user is stored or available. When the Web server receives the request from a browser, it replies back to the browser, which is client in this case. The information basically contains the HTTP protocol version, name of the server, the media type of the document and date, etc. The media type of the document is quite important information because the browser is required to know what kind of document this is before it can process it. HTML is the most common media type transferred over the Web. Other media types are GIF image and JPEG image. When a response like 'HTTP 404 Not Found' is displayed, it means that the request document is not available at the link. There are different responses defined in HTTP. Briefly, in order to access a Web page, HTTP involves browser that issues a request followed by a few headers. In response, the server replies back with a few headers and a document.

The Web server basically maps the URLs to files on its hard disks. The Web server interprets the path in any URL to map it with a filename on its hard disk. In order to make it work to map with the requisite file, the Web server is configured to contain a 'document root' directory relative to which all URLs are resolved as filenames. When a user types the URL into browser, the browser requests the server for the document. The Web server begins searching in the directory for a file. If the requisite file is available, it responds with a header followed by the document. If it is not available, it responds with a 'HTTP 404 Not Found' followed by a helpful error message telling the user to search elsewhere.

5.9 FILE TRANSFER PROTOCOL (FTP)

You have read about FTP in Unit 3. TFTP, like FTP, is also an Internet service intended for the transfer of files from one computer to another over a network. It

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does not provide password protection or user directory capability. However, unlike the FTP, TFTP does not rely on TCP for transport services. Instead, TFTP uses UDP to shuttle the requested file to the TFTP client. Furthermore, diskless devices which keep software in ROM to boot themselves, can have access to it. It is simpler than the FTP but less capable. TFTP facilitates sending of files across the network with a fewer security features than FTP.

Check Your Progress

7. What do the two different connections which form a part of Bakne and Badrinath's indirect TCP go?
8. How many words are included in the IP header?
9. Give some examples of the usage of UDP.
10. What are some of the most common media type transferred over the Web?

5.10 TELNET

You have read about the concept in Unit 3. A remote login facility enables a user to create a login session to a remote machine and then execute commands. Telnet is an Internet standard remote login protocol which is used to connect a local terminal with a remote login session. It copies keystrokes to the remote machine and copies output from the remote machine to the source machine. Telnet is a program that allows a user with remote login capabilities to use the computing resources and services available on the host. It emulates the remote terminal on your desktop and is therefore, referred to as terminal emulation protocol of TCP/IP. Telnet can also be used to connect other ports which are serving user defined as well as well-known services. It works as a client server model where it establishes a virtual connection using the TCP transport protocol. The telnet program requires two arguments, namely the name of the computer on which the server runs and the protocol port number of the server. After establishing the connection, the Telnet server and the client enter a phase of option negotiation to determine the options that each side supports for the connection. They are always free to change their options even after establishing the connection. This provides it with a versatile terminal emulation due to various options available. The functions it performs include transferring binary data, supporting byte macros, emulating graphics terminals, and conveying information to support the centralized terminal management.

Telnet service is unique in so far that it is not platform-specific like other TCP/IP services. A DOS user running Telnet, for example, can connect to a UNIX host or a mainframe computer. However, the biggest disadvantage of using the Telnet is that unless the user is familiar with the operating system running on the

remote platform, he or she cannot use the desired resources easily. Telnet aims at providing three services, which are as follows:

1. Telnet defines a Network Virtual Terminal (NVT) standard to describe a standard terminal. Client programs then interact with the NVT. The server translates NVT operations into specific commands to the actual hardware/ operating system.
2. Telnet enables the remote machines connecting together to negotiate options with one another. Option negotiation helps both the remote machines reach an agreement with regard to a common level of service.
3. Telnet treats connections of the symmetrical remote machines and enables them to use programs. Telnet also defines data and command sequences to deal with heterogeneity. The client machine translates keystrokes into NVT format and sends them to the server machine at remote location. The server machine translates NVT operations into the appropriate local representation.

Some of the Telnet commands are given below:

- Interrupt Process (IP) – It terminates the running program.
- Abort Output (AO) – It serves to discard any buffered output.
- Are You There (AYT) – This command allows the client to send an out-of-band query to verify whether the remote end is still there.
- Erase Character (EC) – It is used to erase the previous character.
- Erase Line (EL) – It deletes the entire current line.
- Synchronize – It clears data path to remote party.
- Break - It is an equivalent of the BREAK or ATTENTION key.

5.11 POST OFFICE PROTOCOL (POP)

For flexibility, TCP/IP uses a variety of mailbox access and retrieval protocols and methods to allow users to read e-mail. Three different models describe how these different methods work:

- The *online* model, in which e-mail is accessed and read on the server.
- The *offline* model, in which mail is transferred to the client device and used there.
- The *disconnected* model, where mail is retrieved and read offline but remains on the server with changes synchronized for consistency.

TCP/IP Post Office Protocol (POP/POP3)

The *Post Office Protocol (POP)* is currently the most popular TCP/IP e-mail access and retrieval protocol. It implements the offline access model, allowing users to retrieve mail from their SMTP server and use it on their local client computers. It is specifically designed to be a very simple protocol and has only

small number of commands. The current revision of POP is version 3 and the protocol is usually abbreviated *POP3* for that reason.

POP3 General Operation, Client/Server Communication and Session States

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POP3 is a regular TCP/IP client/server protocol. To provide access to mailboxes, POP3 server software must be installed and continuously running on the server where the mailboxes are located. POP3 uses the Transmission Control Protocol (TCP) for communication, to ensure the reliable transfer of commands, responses and message data. POP3 servers 'listen' on well-known port number 110 for incoming connection requests from POP3 clients. After a TCP connection is established, the POP3 session is activated. The client sends commands to the server, which replies with responses and/or e-mail message contents.

POP3 is a client/server protocol that is described using a simple linear sequence of states.

1. ***Authorization*** **State:** The server provides a greeting to the client to indicate that it is ready for commands. The client then provides authentication information to allow access to the user's mailbox. By default, POP3 uses only a simple user name/password authentication method.
2. ***Transaction*** **State:** The client is allowed to perform various operations on the mailbox. These include listing and retrieving messages and marking retrieved messages for deletion. The client normally begins by first retrieving statistics about the mailbox from the server and obtaining a list of the messages in the mailbox. The client then retrieves each message one at a time, marks each retrieved message for deletion on the server.
3. ***Update*** **State:** When the client is done with all of its tasks and issues the *QUIT* command, the session enters this state automatically, where the server actually deletes the messages marked for deletion in the *Transaction* state. This concludes the session and the TCP connection between the two is terminated.

TCP/IP Internet Mail Access Protocol (IMAP/IMAP4)

The Post Office Protocol (POP) is popular because of its simplicity and long history, but POP has few features and normally only supports the rather limited *offline* mail access method. To provide more flexibility for users in how they access, retrieve and work with e-mail messages, the *Internet Message Access Protocol* (*IMAP*) was developed. IMAP is primarily used in the online and disconnected access models; it allows users to access mail from many different devices, manage multiple mailboxes, select only certain messages for downloading and much more. Due to its many capabilities, it is growing in popularity.

NOTES

IMAP Authentication Methods

The authentication methods are:

1. **Plain Login:** This is the typical 'user name/password' technique, using the LOGIN command by itself. This is similar to the scheme used in POP3, except that in IMAP4 one command is used to send both the user name and password. Since the command and parameters are sent in plain text, this is by far the least secure method of authentication and is not recommended as per the standards unless some other means is used in conjunction.
2. **TLS Login:** This is a secure login where the Transport Layer Security (TLS) protocol is first enabled with the STARTTLS command and then the LOGIN command can be used securely. Note that STARTTLS only causes the TLS negotiation to begin and does not itself cause the IMAP client to be authenticated. Either LOGIN or AUTHENTICATE must still be used.
3. **Negotiated Authentication Method:** The AUTHENTICATE command allows the client and server to use any authentication scheme that they both support. The server may indicate the schemes it supports in response to a CAPABILITY command. Once the authentication mechanism is specified, the server and client exchange authentication information as required by the mechanism specified. This may require one or more additional lines of data to be sent.

IMAP Commands, Results and Responses

Once an IMAP session is established, all communication between the client and server takes place in the form of *commands* sent by the client and *responses* returned by the server. Like POP3, commands and responses are sent as strings of ASCII text and terminated with a 'CRLF' sequence, making them compatible with the way data is sent using the Telnet Protocol.

IMAP tags its commands with a unique identifier. These tags can then be used in replies by the server to match replies with the commands to which they correspond. This enables multiple commands to be sent to an IMAP server in succession.

5.12 SIMPLE MAIL TRANSFER PROTOCOL (SMTP)

The Simple Mail Transfer Protocol (SMTP) is the de facto standard of an electronic mail (e-mail) service provider. It is intended for the transfer of e-mail messages across the network. The protocol itself is simple because it uses the services of TCP where much of the hard work is handled by lower-level protocols. SMTP uses TCP transport for the reliable delivery of mail messages. For this purpose, MTA opens a TCP connection to a destination location and sends the message to

the destination at this location. The remote MTA at the mail server of remote location, stores the message in its storage and returns an acknowledgment after it has saved the message successfully. Thereafter, the sender removes its copy. When the destination address is unavailable, the MTA once again attempts to send the message later on. In case the message is not delivered in the specified time period, then the MTA returns an error to the user.

In case of an outgoing mail, the SMTP client connects to the SMTP server and sends the mail to the remote server. It uses simple and text-based protocol for one or more destinations of the message. SMTP server also facilitates telnet service. SMTP can be considered as a supplement of UUCP (Unix-to-Unix Copy Protocol). Machines connected together can transfer emails using UUCP, but it is not the same in the case of machines connected across the network.

SMTP is also concerned with transferring mail from one MTA to another. The SMTP protocol is quite simple. It uses the query response model and defines only a few types of messages. The other sophisticated tasks are handled by TCP. SMTP commands consist of human-readable ASCII strings. A single TCP connection is used to serially process a set of message exchanges between a pair of hosts. SMTP never authenticates a sender. Initially, SMTP was implemented using Sendmail as the mail transfer agent in client server model. Subsequently, standard for binary file came to be included in addition to purely ASCII text-based standard. Initially, Multipurpose Internet Mail Extensions (MIME) standard were used to encode binary files for transfer through SMTP, which has now become a standard with its varied version. SMTP along with Post office Protocol (POP3) or Internet Message Access Protocol (IMAP) allows retrieving of mail from the mail server. In other words, SMTP is a push kind of protocol whereas POP3 and IMAP are pull protocol.

Internet mail has an important advantage over other mail systems, for example, UUCP or bitnet. This is because Internet mail system provides an end-to-end reliable delivery system. In contrast to other mail systems, in the Internet mail system, all mail addresses have the same form: local-part@domain-name.

Check Your Progress

11. State the biggest disadvantage of using the Telnet.
12. What does the POP3 use for communication?
13. What is the basic difference between the SMTP and POP3 and IMAP?

5.13 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. The International Organization for Standardization (ISO) developed the OSI model to help facilitate data transfer between network nodes.

NOTES

2. The first layer of the OSI model deals with the actual hardware of networks and the specific methods of sending bits from one device to another. The second layer also deals with signaling and hardware.
3. Some of the examples of the data link layers are HDLC and Ethernet.
4. The Session layer (Layer 5) is the layer of OSI model which is responsible for establishing, maintaining, and arbitrating the dialogs between communicating applications.
5. The TCP/IP protocol suite was developed with the objective to specify a suite of protocols capable of providing transparent communications interoperability services between computers of all sizes, regardless of the hardware or operating system platforms supporting them.
6. It is in the internet layer of the TCP/IP model, that the Internet Control Message Protocol and routing protocols are found.
7. There are two different connections which form a part of Bakne and Badrinath's indirect TCP. The first connection goes from the sender base station and the second one goes from the base station to the receiver.
8. The IP header consists of five or six 32-bit words and the sixth word is attributed to the IP options field.
9. Some examples of the usage of UDP are remote file server using Network File System or NFS, name translation using Domain Name System or DNS, intra-domain using Routing Information Protocol or RIP, network management using Simple Network Management Protocol or SNMP, multimedia applications and telephony.
10. HTML is the most common media type transferred over the Web. Other media types are GIF image and JPEG image.
11. The biggest disadvantage of using the Telnet is that unless the user is familiar with the operating system running on the remote platform, he or she cannot use the desired resources easily.
12. POP3 uses the Transmission Control Protocol (TCP) for communication, to ensure the reliable transfer of commands, responses and message data.
13. The basic difference between the SMT and the POP3 and IMAP are that the SMTP is a push kind of protocol whereas POP3 and IMAP are pull protocol.

5.14 SUMMARY

- A network is designed to provide reliable transmission of packets from one end of the network to other remote parts of the network. A network consists of several components including the hardware and software devices.

NOTES

- Computers in the early networks could typically communicate only with computers from the same manufacturer. At the end of the 1970s, the Open System Interconnection (OSI) model was developed by the International Organization for Standardization (ISO) to break this barrier.
- The seven layers of the OSI Model are categorized into two-layer groupings. The lower layers are Layers 1, 2, 3 and 4 and the upper layers are Layers 5, 6 and 7. The top three layers define the way the applications within the end stations will communicate with each other and with users while the bottom four layers define how data is transmitted end-to-end.
- The TCP/IP model is composed of four layers which are logically considered equivalent to the top six layers of the OSI reference model.
- The transport protocols are independent of the underlying network layer technology. Transmission Control Protocol (TCP) does not consider where the IP runs over the fiber or over radio. The idea behind the implementation of wireless TCP is to reduce the network load and thus alleviate the congestion.
- In contrast to TCP, IP protocol is a connectionless type of service, which operates at the third layer of the OSI reference model. This type of protocol is appropriate for the sporadic transmission of data to a number of destinations.
- User Datagram Protocol (UDP) enables application programs to have direct control to a datagram delivery service similar to the delivery service that IP provides.
- Dynamic Host Configuration Protocol (DHCP) is a communications protocol that lets network administrators centrally manager and automate the assignment of Internet Protocol addresses in an organization's network.
- In order to access any Website, the Web browsers are used, which are assisted by the URL that uses the HTTP scheme. It is the URL or the port number that assists the browser to link with a Website.
- TFTP, like FTP is also an Internet service intended for the transfer of files from one computer to another over a network.
- A remote login facility enables a user to create a login session to a remote machine and then execute commands. Telnet is an Internet standard remote login protocol which is used to connect a local terminal with a remote login session.
- The Post Office Protocol is the currently the most popular TCP/IP e-mail access and retrieval protocol. It implements the offline access model, allowing users to retrieve mail from their SMTO server and use it on their local client computers.

- To provide more flexibility for users in how they access, retrieve and work with e-mail messages, the Internet Message Access Protocol (IMAP) was developed. It is primarily used in the online and disconnected access models.
- The Simple Mail Transfer Protocol (SMTP) is the de facto standard of an electronic mail service provider. It is intended for the transfer of e-mail messages across the network.

NOTES

5.15 KEY WORDS

- **OSI:** Also known as Open System Interconnection, is a set of guidelines for application developers to create and implement applications for computer networks
- **IP protocol:** A connectionless protocol by which data is sent from one computer to another on the Internet
- **Throughput**: It defines the number of bytes of user data transferred per second in a defined time interval; for each communication link, it is measured separately
- **SMTP:** It is a standard for the exchange of mail between two computers (STD 10/RFC 821), that specifies the protocol used to send mail between TCP/IP hosts

5.16 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short-Answer Questions

1. What are the guidelines that were applied to arrive at the seven layers of the OSI model?
2. Briefly explain the key concepts of the OSI model.
3. Write a short note on the correspondence between the OSI and the TCP/IP models.
4. What are the major features of the wireless TCP?
5. What are the different fields of the IP header?
6. What is the DHCP?
7. Write short notes on the HTTP and FTP.
8. What are the services provided by Telnet?
9. Briefly explain the Simple Mail Transfer Protocol.

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Long-Answer Questions

1. Examine the lower layers of the OSI model.
2. Describe, in detail, the upper layers of the OSI model.
3. Discuss the four layers of the TCP/IP reference model.
4. Explain, in detail, the User Datagram Protocol.
5. Describe the Post Office Protocol.

5.17 FURTHER READINGS

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NOTES

UNIT 6 XML AND DATA WAREHOUSING

Structure

6.0 INTRODUCTION

HTML, the most popular markup language, has been developed for displaying data and specifying the ways data will be displayed. XML has been designed to describe and layout a structure for the data. XML itself does not actually describe the ways to display the data or what exactly needs to be done with the data. It helps in structuring the data in a standard manner. This enables other systems to interpret XML. In other words, it provides an 'interoperable file format' which can be interpreted using other languages. In this unit, you will learn about the concept, structure, and uses of XML in businesses. You will also learn about the concept of data warehousing and its elements like data marts and operational data stores.

6.1 OBJECTIVES

After going through this unit, you will be able to:

- Describe the concept of XML
- Discuss the business importance is using XML based technology
- Explain the concept of data warehousing and marts

6.2 DEFINITION OF XML: DEVELOPMENT GOALS

NOTES

XML stands for '**eXtensible Markup Language**'. It is a general purpose specification which is commonly used for creating custom markup languages. It is an extensible language as it provides its users the ability to define their own elements. Enables and users to create custom tags that suit their requirement. XML has been primarily developed to enable information systems for sharing their structured data online. It can be used to encode documents as well as to serialize data so that it can be efficiently used. Some of the salient features of XML have been summarized as follows:

- XML can be understood as an extensible language which is freely available.
- XML tags are the user-defined tags not predefined. In case of HTML, predefined tags are used (like `<p>`, `<h1>`, etc.). While using XML, users can define custom tags and develop document structure as per their requirement.
- XML is not a replacement for HTML. It is actually a complement to HTML. Both scripting languages have their own purpose. As the Web is developing, XML is being popularly used to describe and structure the data, whereas HTML is being be used for formatting and displaying the data.
- XML has been inherited from Standard Generalized Markup Language (SGML). SGML is an ISO standard that defines an extremely powerful markup language. It is popularly used in the publishing industry and large manufacturing companies. It is a meta language used for creating other markup languages, such as HTML. It marks the origin of XML.
- XML can be understood as a markup language like HTML which is commonly used for scripting a Web page. It is specifically designed to describe data so that it can be effectively stored online. XML enables structuring of data so that it can then be mined to get suitable information. In XML, unlike HTML, there are no predefined tags. XML can also be called as a self-descriptive markup language as users can define their own tags.

For better understanding of the concept, check out the following example:

Suppose you are storing information about a set of books. You may store the information in HTML as follows:

Book.html

```
<HTML>
<head><title>Storing InFORMation</title></head>
<BODY>
<p> Linear Programming by A.S. Bajaj<br>
 <p> Marketing Research by Kotler</p>
```

```
</BODY>
</HTML>
```

Book.xml

```
<catalog>
<book>
<title>Linear Programming<-title>
<author>A.S Bajaj</author>
</book>
<book>
<title>Marketing Research<-title>
<author>Kotler</author>
</book>
</catalog>
```

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In the preceding example, you can easily define data in an XML file. The file shows that a catalog of books is being developed which contains the title and author details of the book. You can see that the file size in XML is greater than the other file size. You may feel that XML will lose its efficiency from this increased size. However, XML makes up for this loss by speeding up the processing of a well-defined XML file. The way you interpret an HTML file is dependent on the predefined tags available in it. In contrast, XML file tags are user defined and represent a piece of information in a hierarchical manner. Such kind of data is also called **metadata**. Such data provides great strength to XML as it provides you the ability to create your own specifications and structuring the data in the way you want it to be interpreted by any other system.

6.2.1 Comparison between HTML and XML

As already mentioned, you cannot use XML for replacing HTML. Both XML and HTML have been designed for different goals, which can be summarized as follows:

- XML is designed specifically for describing and structuring data, whereas HTML is used for formatting and displaying data.
- XML is focused on defining data with its attributes. It basically tells what data is all about. HTML, on the other hand is focused on presentation of data and is used to customize the looks of data.
- In case of HTML, document tags which are to be used and the structure of the documents are predefined. While using HTML, you can only use tags which are predefined in the HTML standards. In case of XML, on the other hand, you can define your own tags and develop your own document structure.
- An XML document is saved with an extension .XML, whereas an HTML document is saved as .HTML.

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An example of an `e-mail` from Ram to Shyam stored as XML is as follows:

```
<email>
<to>Ram</to>
<from>Shyam </from>
<subject>Hi how are you?</subject>
<content>Let's go for a New Year party</content>
</email>
```

In this example, an `email` has been stored using XML markup language. You can see that tags have been created to store the names of sender and receiver. Similarly, different tags have been created to store the subject and content of the Web page.

Growth of XML in India

Many reasons are responsible for the success of XML language companies in India. The Indian XML language companies, along with the multinational giants are competing for the Indian IT market.

India provides the world with cheap and skilled XML language professionals, that is available in abundance. The XML language companies can thus use this cheap and skilled labor for developing cost-effective business solutions for e-commerce companies. (Mark Humphries, Michael W. Hawkins, Michelle C. Dy (1999))

Thus, in India XML language is helping e-commerce companies in placing their products and services in the global market at a very competitive rate. India is a crucial destination for usage of XML for many big world companies. Many multinational IT giants make India an offshore development center for XML.

Check Your Progress

1. From where has the XML been inherited?
2. Which out of the two is used for formatting and displaying data?

6.3 BUSINESS IMPORTANCE IN USING XML BASED TECHNOLOGY

In this section, you will learn about the business-related importance of using XML based technology through its advantages, disadvantages and its structure.

Advantages and Applications

There are many advantages and applications of XML. The same have been listed below:

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1. The XML language supports Unicode, thus it allows any information which can be written in the human language and can be communicated to the consumers on the web portal of the company.
2. The XML could be used to maintain the common computer science data structures which include the records, lists, and trees.
3. XLM is a self-documenting format thus it could describe the structure names along with the specific values.
4. It is the strict syntax along with the other requirements which make it necessary that the parsing algorithms become simple, and consistent.
5. XML is a format which is majorly used for the format for document storage along with data processing, which could be both online and offline.
6. The XML is based on international standards and could be updated incrementally.
7. XML validation which uses the schema languages like XSD and Schematron, could be of help to get the effective unit-testing, acceptance testing, and software construction.
8. The hierarchical structure could be suitable for most of the different type of documents.
9. This is a platform-independent language thus the same could cater to the changes in the technology.
10. Forward and backward compatibility could be easier to maintain although there could be changes in DTD (Document Type Definition).

Disadvantages

1. XML syntax has become redundant in comparison to the binary representations of the same data. This is the case specially when it comes to the tabular data.
2. This known redundancy could affect the application efficiency by the higher storage, and processing costs.
3. The XML syntax is verbose, when it comes to the human readers. Also, it is verbose as when it comes to the application of the same on the 'text-based' data transmission format alternatives.

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4. It is the hierarchical model for representation, which is limited when it comes to the object-oriented graph.
5. Also, there is an overlapping (non-hierarchical) node relationships that could need an extra effort for XML.
6. XML namespaces could be a source of problem when it comes to using the same as the namespace support can be difficult to correctly implement when it comes to the XML parser.
7. XML could be seen as the 'self-documenting' but the depiction of the same ignores critical ambiguities.
8. There is a distinction among the content and attributes which are seen in the XML. The same seems unnatural and could lead to making formatting the XML data structures more difficult.

6.3.1 Structure of an XML Document

An XML *document* could be said to be the basic unit of XML information which consists of the elements along with the markup. The same is represented in an orderly package. The XML *document* could have in it a wide variety of data. Some of the common data which is present in the XML document could be the database of numbers, where the numbers show a molecular structure or are present in the form of a mathematical equation.

One of the examples of the XML Document has been shown below:

```
<?xml version = "1.0"?>
<contact-info>
 <name>Tanmay Patil</name>
 <company>TutorialsPoint</company>
 <phone>(011) 123-4567</phone>
</contact-info>
```

The image given below shows the various components of the parts of XML document.



Fig. 6.1 *Components of the Parts of the XML Document*

It can be seen in the image that the XML document consists of the following two parts namely, the document prolog and the document elements.

Document Prolog is present at the top of the document and is placed just before the root element. The document prolog section will consist of the XML declaration and the Document type declaration.

The second part of the XML document is the Document Elements Section. In this section, there is a presence of the building blocks of XML. Thus, the document would be divided into a hierarchy of sections. Each of the sections serves a particular purpose. One can thus separate a document in multiple sections. Thus, the different sections could be rendered differently and the same could be done with the help of a search engine. The elements could be containers, which have a combination of text along with other elements.

6.3.2 XHTML and X/Secure

Extensible Hypertext Markup Language (XHTML) could be said to be of the family of XML markup languages. The same is an extended version of the presently used Hypertext Markup Language (HTML). This is a language (particularly XML) used for the formulation of the Web pages. It allows the users of the XHTML to modify and add elements to the current ones on the Web page. The advantage of the XHTML is that it is extensible and portable. New possibilities for newer presentations are available now. Compared to HTML, it has more defined rules thus appearing to be busier; it allows developers to add new elements; and it promotes the application of more structured yet creative content.

XML security looks at ensuring the security of the XML across the internet. It has certain core principles including the security of signatures, encryption, key management, authentication and authorization assertions, and stating authorization rules. These measures have become important in today's era of using larger platform of public internet. These security standards are aimed at providing secure authentication, authorization, integrity, signature, confidentiality, privacy and digital rights management.

Secure Electronic Transaction is a system that makes sure that the security of the electronic transactions can be done when using the credit card. The same is very crucial for e-commerce. SET is a system which enables the payment and is also a security protocol which can be applied on these payments. This could use different encryption and there could be major techniques which could secure payments on the internet with the help of credit cards. This SET protocol can be supported by major organizations which include Mastercard, Visa, etc. The Microsoft provides the Secure Transaction XML technology (STT) and NetScape that provides the XML technology for the Secure Socket Layer (SSL).

NOTES

SET protocol limits the exposure of the details of the credit card details to some unknown merchants which then helps securing the data for hackers in e-commerce. SET protocol will also entail the Certification Authorities which could be used for the standard Digital Certificates which include the ones like X.509 Certificate.

Check Your Progress

3. What does the quality of XML 'supports Unicode' mean?
4. What does the document prolog section consist of in XML document?
5. State the advantage of XHTML.

6.4 DATA WAREHOUSING AND DATA MARTS

According to W.H. Inmon, known as the father of the data warehouse concept, '*A data warehouse is a subject oriented, integrated, non-volatile and time-variant collection of data in support of management's decisions*.'

Subject oriented means that database is organized in a data warehouse in a subject-wise manner even at the expense of redundancy. Thus, every manager would have access to the desired information in the shortest possible time notwithstanding the extra space occupied by it.

Integrated implies related database tables created in the form of fact and dimension tables that can be linked to each other and are not stored as standalone data resources.

Non-volatile means storage of data on a permanent, non-destructible basis. It can be purged or removed only as an exception for an organizational need.

To be time variant, it requires all data to be entered in the data warehouse to be time stamped or associated with its time of entry. The time element introduced may not be the actual time when data was entered in the operational system.

Data Warehouse Building Blocks

The following are the building blocks of data warehouse:

Data Pre-Processing Tools

Data pre-processing means sourcing, acquisition, cleaning and transformation of data prior to its entry into a data warehouse repository. Data is received from

legacy systems, the Web or other external sources. The data and database from where it is received will be heterogeneous and requires:

(i) Removing unwanted data.

(ii) Converting to common data and definition names:

(a) Summarizing the data.

(b) Completing missing data.

Operational Data Store

Data is transformed and loaded into the Operational Data Store (ODS) in real-time frame. From the ODS it is loaded into the data warehouse after extraction and cleaning operations at regular intervals, but not as and when received from external sources. As such a time of entry is attached with it. The data, thus, available is loaded under the control of metadata.

Metadata

Metadata is data about data and keeps information as:

(i) ***Technical Metadata:*** It contains the sources of access data, data structure, transformation description, rules specified during data processing, access authorizations and backup history.

(ii) ***Business Metadata:*** It contains information about the subject areas, information object types, the Internet home pages, details of information delivery system, that is, when to dispatch information and to whom, data warehouse operational information and ownership details.

Data Warehouse Database

It is the central database consisting of data warehouse RDBMS, a large repository and supporting databases such as multi-relational database, multidimensional database and data marts.

Data Mart

Data mart is another important component of data warehouse and is a data store that is subsidiary to a data warehouse. It is created to meet specific information needs of different functional area managers. Data marts are a part of the data warehouse database and cannot be taken as an alternative for data warehouse.

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Management and Administration Tools

They are provided for:

(i) Managing and updating metadata.

(ii) Providing backup and recovery.

(iii) Removing unwanted data.

(iv) Providing security and assigning priorities.

(v) Checking quality.

(vi) Distributing data.

Access Tools

They are categorized as:

(i) ***Query and Reporting Tools:*** A querying and reporting tool helps you run regular reports, create organized listing and perform cross-tabular reporting and querying.

(ii) ***Application Tools:*** To meet specific user requirements.

(iii) ***Data Mining Tools:*** To discover knowledge, data visualization and for correcting data when the input data is incomplete.

(iv) ***OLAP Tools:*** These are associated with multidimensional databases to provide elaborate, complex views for analysis.

Information Delivery System

It provides an external interface to provide data warehouse reports, information objects to external users as per a specified schedule.

Granularity of Data

Granularity of data refers to the level of detail or summarization at which data is stored in a data warehouse. Larger the granularity less will be the detail available for those data items and vice versa also holds good. A data warehouse manager is required to identify the granularity of data for his organization so that reports of the requisite detail are available.

An example is the maintenance of details of all calls made by a mobile user by the telecom operator to provide a high level of detail (low level of granularity) to meet legal requirements at a later stage.

Granular data offers the advantage of reusability of data by other users and also helps in optimizing the storage space.

Multidimensional Data Models and Schemas

Data warehouses and OLAP tools are based on what is known as a multidimensional model. Data is visualized as a data cube in such a model identified by fact and dimension tables.

Facts are the numerical measures of a central theme, for example a student. The measures may be Marks obtained; Division scored.

Dimensions are the entities with respect to which an organization keeps its records; for example, teacher, subject, class, college, university, etc.

Concept Hierarchies

It is a method of defining a sequence of identifying levels for each entity, for example, city, district, state and country.

Schemas

While Entity-Relationship Model (E-R Model) was found adequate in the design of relational databases, a data warehouse requires a subject-oriented schema for better analysis and handling of more complex queries.

Three schemas are, therefore, created to meet the data warehouse requirements. These are as follows:

(i) ***Star Schema:*** It is the most common model. In the star schema there is a large central fact table containing numerical data without duplication or redundancy. A large number of dimension tables are referred by it. Each of these handles a dimension.

(ii) ***Snowflake Schema:*** It is an extension of star schema. The dimension tables are further normalized, and extra tables are added.

(iii) ***Fact Constellation Schema:*** It has multiple fact tables to meet the requirements of more advanced applications. Fact tables are permitted to share dimension tables.

Data Warehouse Design

A data warehouse design involves:

(i) Choosing a business process to model, for example orders, invoices, shipments, etc.

(ii) Choosing a DWH for a large organization while selecting a data mart for departmental implementation.

(iii) Choosing the grain of the business—the fundamental, atomic level of data to be represented in the fact table.

(iv) Choosing the dimensions to be applied to each fact table.

(v) Choosing the measures that will populate each fact table record, for example, Units _sold, Rs_sold.

NOTES

Based on these five principles, a nine-step method is evolved as follows:

(i) Choosing the subject matter.

(ii) Deciding what the fact table represents.

(iii) Identifying and conforming the dimensions.

(iv) Choosing the facts.

(v) Storing pre-calculations in the fact table.

(vi) Rounding out the dimension tables.

(vii) Choosing the duration of the databases.

(viii) Tracking the slowly changing dimensions.

(ix) Deciding the query priorities.

Data Warehouse Architecture

Data warehouse architecture is based on an RDBMS system server. It has a massive central repository for storage of data, subsidiary databases and front-end tools.

The architecture consists of:

(i) **Bottom Tier:** An RDBMS and a DWH server

(ii) **Middle Tier:** An OLAP server

(iii) **Top Tier:** Front-end tools

Virtual Warehouse

Another commonly used term is the virtual server. It is a set of views over operational databases. For efficient query processing, some of the possible summary views are materialized. It is easy to build but requires excess capacity of operational database servers.

Developing a Data Warehouse

It involves:

(i) Defining a high-level corporate data model.

(ii) Developing an enterprise data warehouse and continuing to refine it to meet user requirements.

(iii) Developing parallel data marts and refining these models.

NOTES

Check Your Progress

6. What is business metadata?
7. Why are data marts created?
8. Define granularity of data.
9. What is the data warehouse architecture based on?

6.5 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. XML has been inherited from Standard generalized Markup language (SGML).
2. HTML is used for formatting and displaying data, whereas XML is designed specifically for describing and structuring data.
3. The XML language supports Unicode, thus it allows any information which can be written in the human language and can be communicated to the consumers on the web portal of the company.
4. The document prolog section will consist of the XML declaration and the Document type declaration.
5. The advantage of the XHTML is that it is extensible and portable.
6. Business Metadata contains information about the subject areas, information object types, the Internet home pages, details of information delivery system, that is, when to dispatch information and to whom, data warehouse operational information and ownership details.
7. Data marts are created to meet specific information needs of different functional area managers.
8. Granularity of data refers to the level of detail or summarization at which data is stored in a data warehouse. Larger the granularity less will be the detail available for those data items and vice versa also holds good.
9. Data warehouse architecture is based on an RDBMS system server.

6.6 SUMMARY

- XML stands for 'eXtensible Markup Language'. It is a general-purpose specification which is commonly used for creating custom markup languages. It is an extensible language as it provides its users the ability to define their own elements.

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- XML is not a replacement for HTML. It is actually a complement to HTML. Both scripting languages have their own purpose. As the Web is developing, XML is being popularly used to describe and structure the data, whereas HTML is being be used for formatting and displaying the data.
- XML is specifically designed to describe data so that it can be effectively stored online. XML enables structuring of data so that it can then be mined to get suitable information.
- The many advantages of XML include the following: it supports Unicode, can be used to maintain common records, has a self-documenting format, has a strict syntax, the format can be used both online and offline, has international standards, etc.
- The disadvantages of XML include the following: it has been redundant, is verbose, has a limited hierarchical structure, has overlapping node relationships, etc.
- An XML *document* could be said to be the basic unit of XML information which consists of the elements along with the markup. The same is represented in an orderly package.
- The XML document consists of the following two parts namely, the document prolog and the document elements.
- Extensible Hypertext Markup Language (XHTML) could be said to be of the family of XML markup languages. The same is an extended version of the presently used Hypertext Markup Language (HTML). This is a language (particularly XML) used for the formulation of the Web pages.
- XML security looks at ensuring the security of the XML across the internet. It has certain core principles including the security of signatures, encryption, key management, authentication and authorization assertions, and stating authorization rules.
- According to W.H. Inmon, known as the father of the data warehouse concept, '*A data warehouse is a subject oriented, integrated, non-volatile and time-variant collection of data in support of management's decisions*.'
- The following are the building blocks of data warehouse: data pre-processing tools, operational data store, metadata, data warehouse database, data mart, access tools, information delivery system, etc.
- Data warehouses and OLAP tools are based on what is known as a multidimensional model. Data is visualized as a data cube in such a model identified by fact and dimension tables.

- Data warehouse architecture is based on an RDBMS system server. It has a massive central repository for storage of data, subsidiary databases and front-end tools.
- Developing a data warehouse involves: It involves: (i) Defining a high-level corporate data model, (ii) Developing an enterprise data warehouse and continuing to refine it to meet user requirements and (iii) Developing parallel data marts and refining these models.

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6.7 KEY WORDS

- **eXtensible Markup Language:** A general purpose specification which is commonly used for creating custom markup languages
- **Metadata:** A piece of information in a hierarchical manner
- **Data warehouse:** A subject oriented, integrated, non-volatile and time-variant collection of data in support of management's decisions
- **Data mining tools:** To discover knowledge, data visualization and for correcting data when the input data is incomplete

6.8 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short-Answer Questions

1. List the salient features of XML.
2. Compare HTML and XML.
3. Briefly explain the structure of an XML document.
4. What is XHTML and X-secure?
5. Write a short note on data warehouse design.
6. Briefly explain the categories of access tools in data warehousing.

Long-Answer Questions

1. Discuss the advantages and disadvantages of XML.
2. What are the different data warehousing building blocks?

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UNIT 7 E-MARKETING

NOTES

Structure

7.0 INTRODUCTION

In the previous unit, you were introduced to the concept of XML and data warehousing which related to the storage of data. In this unit, you will learn about the elements necessary for the effective utilization of e-marketing.

The world is changing every minute, every second. Change has taken over the field of marketing too. New methods of marketing, that is, online marketing and e-marketing have evolved. The successful harnessing of Internet marketing has given rise to benefits such as online purchase and sale of goods along with the generation of leads. In this you will learn about the concept of traditional marketing, the concept and advantages of online marketing and the identification of web presence goals and lastly the important element of site adhesion. This will include a discussion on important topics like web designing, maintaining a website, metrics and its measurement and many more.

7.1 OBJECTIVES

After going through this unit, you will be able to:

- List the challenges faced in traditional marketing
- Identify and summarize the advantages of Internet marketing

7.2 TRADITIONAL MARKETING

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Traditional marketing operates on the basis of the four Ps, that is, the correct marketing mix of product, price, promotion and placement. Before launching any product, its production and management, price, promotion, placement or distribution, its retailing and the procedure by which it is delivered to the end-user all need to be planned, decided and taken care of. The target customers need to be segmented and studied so that a detailed marketing plan can be drawn up. Then, an advertising plan is decided upon.

The challenges faced by traditional marketing are as follows:

1. **Expensive Product:** When a company decides the cost of a product, it includes all expenses like product information brochure, shipping charges, mailing and service of human resources, among others. As a result, the cost of product is high.
2. **Lack of Consumer Interaction:** It is not possible for the company to interact with the consumer because between the two, operate the wholesaler and retailer.
3. **Lack of Coordination:** Sometimes, companies face some problems in marketing activities because marketing executives, brochure printers and advertising agencies, etc, lack coordination and all of them cannot perform at the same time because all work has to be passed by management, channel wise. Therefore, delays are inevitable.

With customers being exposed to more and more brands with each passing day, brand recall is reducing. It is difficult for consumers to make a brand choice as all brands are as good as their competitors. This leads to a need for an all-round marketing strategy which covers all the existing modes and also aims at constant brand recall. This is where the reach of the Web plays a significant role.

Retailing in E-Commerce Space

Doing business in cyber space is advantageous to retailers in many ways. It reduces labour costs and helps avoid expenditure on paperwork and merchandising. It is a known fact that online transaction costs are lower. Some of the other merits are as follows:

- Better Customer Service and Satisfaction
- Personalization of Services
- Reduction in Customer Service Cost
- Benefits of an Online Catalogue

7.3 E-MARKETING/ONLINE MARKETING

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The term Internet marketing is interchangeably used for Web marketing, e-marketing, Internet advertising or online marketing. The wide availability of the World Wide Web allows businessmen across the world access to millions of potential customers. All that is required is a few clicks of the mouse. Thanks to the Net, your products and services can be viewed or read about by many people in different parts of the world, at the same time.

Services of professional Web marketers are available these days who ensure that potential customers not only visit your site, but also become regular customers.

Once you subscribe to such services, they help to market your product through various facilities such as the Mall Linking Service. This enables the client's site to get linked to the Internet connection of numerous other online shopping mall service providers. They log on to the sites provided and managed by these marketing specialists. They promote the website according to the nature and function of search engine movements. Marketing techniques such as Advanced Press release services, Click Exposure techniques and Advanced Search Engine facilities are used. Click exposure techniques function through direct targeted keyword advertising. Online marketing services target a chosen category for advertising using effective pop-under. This is qualitative, targeted and scaleable website traffic which can help your business to grow very fast.

In the world of advertising, Internet marketing is one of the popular sources for promoting business, business products and services because of its ability to reach the target audience. An online shopping website is of course an advantage as the facility will then be open all year round and for twenty-four hours a day. Professional Internet marketers will ensure that your business or firm appears right on the top of important search engines and directories. A part of the role of a professional Internet marketer is to make the website design user-friendly, optimize the search engine, optimize the structure of the website, optimize keyword, etc.

Electronic customer relationship management systems and management of digital customer data are also components of Internet marketing. It intermingles the technical and creative features of the Internet, that is, design, advertising, development and sales. Internet marketing involves much more than mere promotion or development of a website or a banner advertisement being placed on a website. Internet marketing that is effective is achievable through a comprehensive strategy. This strategy combines a firm's sales targets and business model with the function and look of its website. This way, it can focus on its target market through correct selection of the kind of design advertising and media.

The Internet does not suffer from any geographical constraints. It is a useful marketing tool and allows you to advertise your products and services online. It does not require you to be physically present with the customer for the sale to take place.

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Before the Internet became popular, a businessman would have had to travel abroad in search of overseas clients and to finalize transactions. As a result, only affluent businessmen or big companies could afford foreign travels. Now, even small-scale businessmen can attract foreign customers and interact with prospective clients without having to travel anywhere.

Unlike the traditional forms of marketing including print and audio/video media, the Internet offers an economical and cost-effective method of marketing. You can get business without bothering to participate in trade fairs or shows.

The Internet enables prospective buyers to go through the product catalogue/ gallery at any hour of the day or night, at their convenience.

For a company with diverse products, advertising on radio and television can be very constraining. The limitation is in terms of the time. In such situations, the Internet offers freedom to display a wide range of products and give detailed descriptions and information related to rates, size, colours, etc.

Increased sales and profits enable the website owner to recover the cost incurred on the maintenance of the website.

It often happens that certain markets are not tapped by a seller because he is not aware of it or is located far away from it. This drawback is taken care of by Internet marketing. As a result, new markets have been discovered.

Types of Internet Marketing

There are many types of Internet marketing. Some of these are discussed as follows:

1. Pay per click
2. Search Engine Optimization (SEO)
3. Internet auctions
4. Affiliate marketing
5. Banner advertising
6. Directory listings
7. Ethical e-mail marketing
8. Viral marketing

7.3.1 Internet Consumer and Market Research—Needs of Website Visitors

While designing a website, a company may have many objectives in mind. An effective website would attract consumers and describe the objectives of the company such as:

1. Creating a healthy relationship with consumers
2. Attracting consumers to the website
3. Designing an interesting website to encourage consumers to explore
4. Motivating consumers to stay on the website

5. Advising consumers to get more information by clicking on the website links

Needs of Website Visitors

When a company's website is designed, then it should:

1. Provide full knowledge of the products or services offered
2. Facilitate easy purchase of the products or services offered
3. Declare full information of product or service warranties, guarantees
4. Offer a complete company profile
5. Offer information related to the person responsible

There are professional agencies who help website owners examine Web audiences by behaviour, size and demographic profile. Their custom research and analyses can not only help a website owner measure the audience, but also evaluate the site, track the traffic on competition's sites, evaluate the strategies of competitors and accordingly update and develop high-quality/effective content.

Research on consumers generally involves the following:

- Identification of the audience
- Segmentation of visitors to the website
- Study of the level of Internet usage by visitors, whether it is light, medium or heavy
- Integration of data pertaining to consumer profiles, sales and attitudes
- Comparison of online and offline performances
- Study of the channels that are used frequently
- Exploration of the ways in which offline and online channels can be used together to gain an edge and increase sales
- Use of custom surveys
- Evaluation of customer satisfaction levels
- Identification of the most effective ways in which customers can be attracted

7.3.2 Advantages and Disadvantages of Online Marketing

Internet marketing or online marketing has its positive as well as negative aspects. Both the merits as well as the demerits have to be understood well before a proper Internet marketing strategy can be created.

Advantages

- The online store is open at all times, day and night. Customers from all parts of the globe can shop at any time of the day or night.

- It is the most economical way of spreading your message. Sending e-mails to subscribers is a lot cheaper than posting letters to them.
- Subscribers can be updated promptly through e-mails. Website visitors can access current and updated information every time they visit the website. Customers can be informed about promotional schemes and sales as soon as they access their e-mails.
- Online magazines/newspapers or law firms are information-sensitive businesses. They can obtain products straight without relying on the courier service. Products can be delivered directly to the customers without using a courier service.

Disadvantages

- Online marketing does not come without a price. The cost of offering the product or providing the service should take into account the expenditure on software, hardware, time, effort, website design and maintenance and online distribution costs.
- Only about 50 per cent of households indulge in online shopping. This means that you are able to reach out only three out of six households.
- The Internet is still regarded as a source of information gathering by most customers. Of the total number of browsers who visit websites, the vast majority motivated to purchase will probably buy in person because people are more comfortable with live interaction during sales transactions. Customers do not show interest in purchasing from small businesses that have only one location.
- It is very important to keep updating your site since outdated information can result in losses.
- The traditional form of old-fashioned customer service is still popular and preferred. The majority of marketers online do not have very strong customer service or inquiry response programmes. As a result, many online visitors may rate a website as having poor customer service even before actually coming in contact with the product/service provider.
- Poor navigation facility also makes it difficult for visitors to search for what they want. This happens more often on websites that are designed from the marketing point of view and not from the customer service point of view.
- The security of various sites is doubted by the visitors. Many visitors do not want to risk transacting online using credit cards for fear of having their personal/credit card information stolen.
- Those visiting your site have probably been to other similar sites as well. A purchase can be guaranteed only if they find exactly what they want.
- Visitors expect some free content or special offers or bonuses.

Check Your Progress

1. Mention the basic advantages of doing business in cyber space.
2. What is the role of professional internet marketers?
3. What is viral marketing?

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7.4 IDENTIFYING AND ACHIEVING WEB PRESENCE GOALS

One cannot build an intelligent website that optimally has all sources of information for an online company, overnight. Actually, it is a long process that requires significant investment in technology, and an accumulation of knowledge that can come only with experimentation and trial and error. Website intelligence leverages four types of information.

(i) *Demographics:* This explains such basic elements of the customers as:
- Who they are
- What their income is
- Their marital status

(ii) *Expressed Preferences:* This explains what topics customers have expressed an interest in; for example, types of music, choice of books, and the stocks they track. The preferences are generally stored through form-based questionnaires provided when the customer registers for a site or a service.

(iii) *Past Transactions:* These are records of past transactions that the consumers have had with a company. They are recorded when a customer actually makes a purchase.

(iv) *Observed Behaviour:* This type of information is derived by observing the manner in which the customer navigates when using the website. It also tracks the sites he visited previous to and after visiting the said site.

Consider the following steps that e-commerce companies typically follow in leveraging their information.

Step 1: Basic Web traffic analysis

Before starting any Web activity, one first needs to analyse the Web traffic. This type of data provides a record of the entry and exit points into a website, pages that were visited, links that were followed, the duration for which a person viewed a particular page, the precise day and time of visit, the browser type, visitor's IP address and other information.

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Step 2: Customer interaction analysis

This step is used to collect more information about the customer's interactions with the website. The registered users are people who have had to register for site usage, generally by filling out a survey form. As you know, in any site (even a free site) the user has to fill a registration form in which there are various types of questions related to profession, education, age, gender, leisure activities, merchandise purchasing, etc. Through this registration process, the site is able to get information related to both the demographics and preference. This type of data is used to help inform personalization engines to serve the contents according to the visitor's interests.

Step 3: Real-time personalization

Personalization is the ultimate realization of the one-to-one marketing dream. Customers are recognized when they come in; they can tailor the way they interact with the merchant; and receive promotions and marketing pogrammes that perfectly fit their personal requirements and preferences.

The following are four ways of personalization:

(a) *Greetings:* This is a more general way of personalization. The customer is greeted by name and welcomed back whenever he or she visits the site.

(b) *Customization:* It allows a customer to tailor the service he or she receives from an e-commerce site. For example, any Hotmail user can customize his use of the popular search engine by creating a 'My Hotmail' environment which is more adapted to his needs.

(c) *Narrowcasting:* This relates to the delivery of time-sensitive information, personalized to each customer. These types of personalized messages can be sent through e-mails, phone calls or pagers which enable the customer to receive information without having to connect to the site.

(d) *Recommendation:* Recommendation technology has evolved dramatically in the past few years. Earlier, it was based only on the preferences that a customer would have explicitly expressed during registration. Now, it can be done in real time and predicted automatically by the personalization engine using different types of information such as observed real-time behaviour, purchase histories and expressed preferences.

Step 4: Getting to fine-grained segmentation

Fine-grained segmentation is used to enhance the site's marketing power by using an e-commerce intelligence system performing customer segmentation. You can start with products that are at hand's reach through coarse segmentation, and then continue to fine-grained segmentation. This step also uses artificial intelligence to conduct knowledge discovery. That is, it can look for patterns in large data sets and identify common elements.

Step 5: Going through the streams of clicks

The click-stream data contains details on customer behaviour that are richer than what can be achieved in traditional channels. Click-stream information is the recording of every page request from every visitor by the website owners. This information is stored into massive log files.

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Step 6: Enrich content with external data

Once a customer performs a number of purchases, the website is able to further enhance the customer's profile. Demographic data from third party providers may be added to the profile to provide a richer view of the customer base. Analysing the enriched data might show, for instance, that a customer who buys history books falls into a demographic segment which is also inclined to buy classical music.

Step 7: Reaching optimal intelligence

A company can reach optimal intelligence once it is able to combine historical transaction records, observed behaviour via click-stream data and preferences expressed in online surveys.

Website: Goals, Objectives and Manpower Required

We have discussed this briefly in Unit 2. Let's recapitulate the idea here.

Before creating a web page, it is important to decide the goals, objectives, and overall purpose of the e-commerce website. Without these, the website may not have the focus it needs to be successful. To help determine the goals and objectives, you have to ask and answer questions such as the following:

- Will the website collect information about current and potential customers?
- Will the website allow the customers to make online orders for products and services?
- Will the website advertise products and services?
- Will the website provide links to the related web pages?
- Will the website provide general information or industry-related information?
- Will the website recruit employees?
- Will the website act as a virtual salesperson that will perform online transactions?
- How many web pages are planned for design?
- Should the site be structured such that it helps in gathering data for the purpose of marketing?
- Is there a requirement for development of special tools to help users when they visit the site?

Based on the answers to the aforementioned questions, you will either require a one-stop shop or separate contractors that will look into each part of the site. The simplicity or complexity of the act of designing a website largely depends on your imagination and/or budget constraints.

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Design vs Development

Often, the terms 'Web designing' and 'Web development' are used interchangeably. This, however, is not an accurate usage. Designing a website and developing one are two very different activities. Designing a website has two components, the 'front end' and the 'back end.' While these have been used interchangeably, usually design means the front-end whereas development means the back-end.

7.4.1 Uniqueness of the Web

What is novel about the Internet is that it not only is a mine of information, but is also available at the click of a button. The Internet is undoubtedly a huge source of knowledge. All that a person requires is a website and a resource-generous Web hosting company. Most people feel that designing a website is an expensive project. This, however, is not true. All that you need to do is to find the right Web host. The benefits of a website will certainly override the costs.

Whether for personal use, or to aid a business venture, the advantages of a website are tremendous. Many who have their own websites use them to further a hobby or an interest since a personal website too can be an excellent avenue for the exchange of knowledge with others. On the other hand, firms use websites such that their goods and services are marketed and promoted. For them, the attractive advantage is that they are able to cut costs involving postage, couriers and advertising, etc. For them, cutting back on such expenses as postage, couriers and advertising, etc., becomes the attractive advantage.

The following are the key benefits of having a website.

- **Increased awareness of products and services**

The Internet allows a business to expand its markets tremendously. Businesses no longer need to limit their focus only to the local scene. Through the use of the Internet, businesses can effortlessly explore international and regional markets. This introduces dynamic changes in participating businesses. This is because, their nature and marketing activities alter and many find encouragement to enter new markets by diversifying their products and services. Trading hours too find extension since numerous items can be viewed on a website round the clock.

- **Freedom**

The Internet provides great freedom to its users. Therefore, not only do those that are otherwise introverts, frequent the Net, but even the smallest of businesses are tempted to join. In fact, such is its growth rate that users are alarmingly increasing at a rate of approximately 50,000 per day. Since information can be freely posted

on the website, and hence the Net, businesses profit in a huge way. Not only has the Net become a huge customer marketplace, but businesses have found a medium that enables them to compete with the largest of organizations, on an even field.

- **Cost advantage**

Web businesses are keenly aware of their profit potential simply by being on the Internet. The advantages are very obvious. They can advertise their products and services and yet avoid the costs and delays caused by such activities as printing, publishing and distribution. Since the Internet offers a global marketplace, greater value is added to the costs outlaid for promotion and marketing. Thus, compared to the offline market, the benefits are many more. Websites incorporate e-commerce facilities that transform 2D screen visuals into user-reactive models. For instance, consumers can place online orders for products and services. This greatly reduces their administration costs. Some of the ways to reduce costs are—follow-ups through e-mails thereby reducing costs incurred by making phone calls, electronically generated and distributed newsletters that reduce printing and distribution costs, and most importantly, extended trading hours.

It is now felt that if any business does not exist on the Internet, then it is not only losing out on the benefits of a dynamic industry, but is also increasing its chances of being forgotten.

Check Your Progress

4. What are the four ways of personalization in internet marketing?
5. What are the two components of website design?

7.5 WEBSITE DESIGNING

In this section, you will learn about the important concepts related to website designing.

Technology Infrastructure Required

A great deal of planning and preparation goes into the development of a successful website. Acquiring the vital tools of the Internet is a significant part of that preparation.

- **HTML Editor**

An HTML editor is a software program used to edit and create HTML documents. This is a tedious process which is why most Internet marketers prefer using an HTML editor. There are some that prefer writing their own HTML code. Nonetheless, HTML editor is an advantageous tool to use, as there are editors that tend to add unnecessary codes which may not support the latest technology.

As a potential Web developer, whether you write your own HTML or use an editor, learning HTML is very essential. Its knowledge not only provides independence, but it also enables one to add special effects a feature that not many HTML editors support.

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- **Text Editor**

A text editor is a software program used to edit text which does not involve any special formatting. Those who write their own HTML code, need an adequate text editor. Although using a text editor can be a time-consuming activity, its use ensures that the code is clean, free from errors and that the file size is not very large. Moreover, a text editor is also useful in writing articles and in editing scripts. Those who have a Windows operating system use the Note Pad as their preferred text editor.

- **FTP**

File Transfer Protocol, or FTP, is a system that is used to upload files to a Web server and download files from a Web server. It provides you a way to control files on the server. This makes it an important tool. An FTP program enables operators to upload scripts, set file permissions, create folders and transfer files to and from a server. To use FTP, a software program that supports it has to be downloaded and installed in the computer; the most popularly used being WS FTP Pro.

- **Graphics Editor**

A graphics editor is a software program used to edit as well as to design graphics.

Most Internet entrepreneurs find graphic designing intimidating. However, since hiring a professional graphics designer can be expensive, most entrepreneurs learn some basic design techniques. The program that Internet marketers use the most is Paint Shop Pro. It is a powerful program and alone can design graphics professionally.

- **Zip/Unzip Software**

A Zip file is an 'archive' of one or more files compressed into one file for easy distribution. These are used to compress and transport file archives over the Internet. Since downloading one Zip file is more convenient than downloading several different files ZIP file is the popular method for distributing files electronically. Moreover, the files in the Zip archive are compressed. Therefore, download time gets minimized.

You can effortlessly extract or unzip a Zip file using a Zip/Unzip software program. WinZip is the most popular Zip program because it makes the use of file archives easy and uncomplicated. WINZIP has certain easy features that allow files to be conveniently viewed, extracted, added, deleted and tested. These features include point-and-click and drop-and-drag.

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- **E-mail**

Most Internet service providers also feature and provide e-mail accounts to their clients. Nonetheless, these accounts are inadequate to conduct business over the Internet. This is more true for those businesses that receive large numbers of e-mails every day. The disadvantage of an e-mail is that it contains the ISP's name and is also very limited when it comes to features and options. Outlook and Eudora are the most popular e-mail clients. Outlook and Eudora enable you to download e-mails from a server. In addition, it offers such features as sorting and filtering. You can easily organize e-mail messages. The most important feature is that your e-mail address remains your own domain and not another's. Therefore, a webmaster toolbox always has a significant role in your success.

Basic Web Languages for Web Designing

- **HTML**

HTML is a method which converts ordinary text into hypertext. Technically speaking, HTML is not a programming language, but a set of special codes that controls a text's layout and appearance. The instructions are within a data. This data informs the browser, which is a display program, how to render the data that is contained in the document.

- **JavaScript**

Originally called LiveScript, JavaScript was developed by Netscape. An agreement with Sun Microsystems changed the original name. The intention was to benefit from the growing popularity of Java Programming language. JavaScript is a language that can be executed on the web browser. Java script programs do not require any software and can run on Internet Explorer or Netscape Navigator. It is a client side scripting language, and is basically used to validate and edit an image, text colours and other things. JavaScript is case-sensitive.

- **VBScript**

Developed by Microsoft, VBScript is a subset of the Visual Basic for Application language used in Microsoft Office suite. Just like the JavaScript, VBScript is also a client-based language. Again, like Java, VBScript is also run on Internet Explorer and Mozilla Firefox. The most pertinent difference between them is that while VB can be compiled, a VBScript cannot be compiled. VBScript is the default ASP scripting language.

- **Perl Script**

Perl is a powerful text processing language. Prior to the development of Active Server Page (ASP), it was extensively used in Common Gateway Interface (CGI) scripting. Perl Script is a subset of Perl and retains most of its functionality. Microsoft does not ship Perl Script with ASP, but it can be downloaded from the Internet.

- **Active Server Page**

Active Server Page (ASP) allows users to be treated as unique entities. This, in spite of the fact that all the users may be running the same program on the same machine, i.e.,your Web server. Needless to say, running a complex program for multiple users on one computer requires many resources. Fortunately, Microsoft makes sure that those resources are at the users's disposal. ASP provides:

- A means by which individualized data can be saved for each other
- Access to the various file systems
- Access to the various databases
- A way by which Control Object Model (COM) can be launched and controlled

In other words, ASP can be used to create multi-user application. This implies that one can obtain application scalability by leveraging ASP.

- **XML**

XML is not just another mark-up language, it is a Meta language. In programming parlance, 'meta' means description. In other words, it is used to provide descriptive information about a document. It is very different from HTML. The main difference is that while HTML is a 'fixed' language, XML is not. HTML has a set, pre-decided structure that has to be followed to make pages workable. XML, on the other hand, is flexible enough to allow users to create their own tags. It can even be extended by creating other mark-up languages with it. XML can be used to write mark-up languages for many kinds of applications. They can be used for ATM machines, databases, etc. It is not only a powerful tool for creating other languages but it also works much like its parent language, SGML. At the same time, the advantage that XML has over SGML is that SGML is extremely complicated while XML is relatively easy to learn and use.

Corporate Strategic Infrastructure Required

Initially, when companies were beginning to establish themselves on the Web, their websites was in their infancy. They were more like static brochures, were not updated frequently with new or additional information and did not possess the ability to help the company's customer or vendor transact business. As Web technology transformed fairly rapidly, only a few businesses were able to catch up with these changes in terms of website development and management.

- **Internal Development vs Outsourcing:** There are a fair number of companies that tend to avoid the problems of e-commerce site development by outsourcing the project. However, this is not advisable. An e-commerce website can be successful only if it integrates and supports those activities which the business is engaging in. Nonetheless there are, companies that are large and technically self-sufficient enough to launch their own e-commerce

projects without requiring external help. The key to the success of any project is that a balance is struck between the support from inside and outside for each project.

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- **Internal Team:** To begin with, a company needs to decide the parts of its e-commerce project that require to be outsourced. This is achieved by creating an internal team that assumes responsibility for the entire project. Such a team should include professionals who have sufficient knowledge about the Internet and the Web. They also need to be creative and interested in taking their company beyond its existing boundaries. Including a technical professional is not sufficient. The person should be knowledgeable about the company's business. In order to create a successful e-commerce project, it is very essential that the appointed people have sound business knowledge, creativity, and are well respected by the company's line managers.

The internal team takes full responsibility for the e-commerce project. This means that from deciding the objectives of the site to their final implementation and operation, the team is ultimately responsible for the initiative. This team also has the responsibility of deciding the sections of the project that need to be outsourced.

Check Your Progress

6. How does an FTP program benefit the operators?
7. Who developed the JavaScript? What was its original name?

7.6 SITE ADHESION: CONTENT, FORMAT AND ACCESS

The messages and content of the website of the company could be very powerful. The consumer's time spent on the website on phones and laptop today is more than that on any desktop. Also 80 per cent of app users have engaged with their apps for about 15 times a day. Thus, the content becomes very crucial for e-commerce.

With relation to content, the idea to create a website which matches the technological sophistication of the user and the impact the grades of content present. Format of the site should be such that the viewer interest is gauged and the manner in which it is presented so that the visitor continues with the interaction on the website. Access refers to the technical details relating to the speed with which the site loads and the features therein work. The landing pages should work with minimum bandwidth, so as to seem easy to use.

There is a lot of competing content, which has to catch attention, develop trust, and meet customer expectations for the company. E-commerce messages could take a variety of forms and could fulfill a number of purposes.

This could be from promotions to transaction, activity messages, consistent and personalized customer experience etc. Some of the most common mobile marketing forms have been described below:

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1. Promotional Campaign Content:

When the company is developing the marketing plans, one as to coordinate the multichannel promotional campaigns with all types of messages. When multiple channels are used the impact is more effective.

2. Transactional Campaigns

Whenever the customer makes an in-app purchase, or changes their password, there could be an automatic email or other message which could be set up to confirm their action.

It has been observed that open rates are twice as high for transactional emails. Thus, the messaging communicates the brand values and is coordinated with other campaigns.

3. Onboarding Campaigns

The goal is to introduce the brand's promise and point out key features which the users will need to understand for getting full value from your company and laying a foundation for consistent engagement.

As most of users engaging in the first week after download could be retained, on boarding could be key for long-term engagement.

4. Opt-In Priming Campaigns

One could have a simple prompting with a native 'opt-in request' for the first time a user opens the company's app, and the opt-in priming campaigns could select the best 'moment' to the value of opting in with a thoughtful nudge.

5. Triggered Campaigns

These personalized messages could be set up to send action. Here a receipt email could be sent, triggered by a purchase. One could also send a congratulatory push message which could be sent after a gaming app user reaches 1,000 points.

These campaigns can be triggered, and transactional campaigns, are also triggered.

Triggered messages could be scheduled to encourage engagement on any day. In case a user has just boarded, then a day after that could be a good time to push a special offer to the consumer for getting the daily engagement going.

One could develop a variety of triggered campaigns for building the customer and brand relationships.

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6. Dynamic Content Campaigns

Dynamic content is the updated information which includes the copy or images which could be inserted into the messages to provide up-to-the-minute relevance.

This content could be good for personalizing a message when one includes the user first names, for pulling information held by the company's marketing platform and automatically adding it into each message that's sent.

A message uses the dynamic content which takes the information from an API, instead of the user profiles.

Push notifications using dynamic content to include stock price and market information.

7. Activity Campaigns

Activity are a great engagement tool. When the company is provided with details of activities of friends or followers (like when someone commented on the post or a friend just submitted a review for a new restaurant), these messages could encourage users to engage across a variety of channels.

Activity campaigns can propagate all sorts of actions and are effective as they provide social proof about the usage of the app or site and a personalized experience for the user.

Active social sites could be overusing activity messages, but careful planning could help one create activity campaigns which provide value.

8. Location-Based Campaigns

These messages could come under a special category which could be more relevant for some brands as compared to others. Here one leverages the location information of users for messages which feature the geographically relevant offers which could be shared.

These messages could be triggered in many ways like messages being triggered, when someone enters the city limits of the geographic location. There could be messages which are important for one geographic area only.

These messages provide targeted deals and customized experiences, but the same should not be so repetitive that the users feels frustrated.

9. Re-Permission Campaigns

These types of campaigns could be very effective on channels like push notifications. In cases the users opt out of a key channel or never opt at all, then one could use re-permission campaigns for featuring what might be missing.

It would be useful to plan out the incentives for re-permission. In case the company's app is intended to share discount deals for the local stores, one could remind users that when they are opting in to push, they could receive alerts when sales pop up for their favorite stores.

Also running re-permission campaigns, could help the company to build a preference center so that users could manage multiple preferences at one single spot.

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One could use all these types of campaigns, at one point, as they are all a part of an effective mobile marketing strategy. These campaigns could help the company start strong, continue engagement, respect the user preferences, and keep the brand at the top of mind.

7.6.1 Maintaining a Website

The company should have a customer-friendly website. The rise in web traffic along with Google's mobile-friendliness ranking factor makes it necessary for the brand's site to adapt the website to devices for staying competitive.

When it comes to search engines, 'web-friendliness' would mean that the content fits on the screen and the user does not have to scroll or zoom from one side to the other. A user-friendly mobile platform will download and upload the Content loads quickly. The Site should have no web-specific errors.

One reason to maintain a customer -friendly site is to have a consistent and engaging user experience. It has been seen that 64% of web users have abandoned pages in case they do not load within 10 seconds. Also it has been noticed that 35% of executives did not make an intended purchase as the website they visited was not mobile-friendly . Also 90% of the user's devices for research on business purchases. Thus, the company has to measure that the user experience is seamless. About 57% of emails are opened on web platforms and 69% of users are deleting emails that isn't optimized for web. Thus, the audience is engaging with email campaigns on web devices.

The website will also give information about the email for the company. Email marketing providers generally use the responsive design which is a strategy that automatically formats web page content for the optimal viewing on any device. There are still some key considerations for designing email CTAs with respect to the mobile users in mind. This has to be kept in mind when making a website.

Also, the landing pages have to be optimized. In case the email is mobile friendly, but the click-through is not taking the user to the landing page, then the same is not optimized for mobile. Thus, the consumer might become frustrated and bounce from the page.

Website has to be made location based. Location based marketing has two elements. The first one is interrelated with the previous point about mobile coupons and the same have to be sent to the right location to redeem them. Targeted advertising can sue the GPS to reach the vast audience. The second part is divided into two aspects, which are the apps or websites within a location. One example of this is Foursquare in which the app allows the user to post an update of where the user is. Also, the Facebook's 'Check in' and other social networks location

finders could integrate mobile and location together so as to tell the users' about the location of the product or service.

Online payments are a very crucial part of mobile marketing today. Money could be transferred through downloading an app money into the user's account. This could help the user to instantly pay for a product on the mobile device.

The online websites have to be optimized. Thus, apart from the websites the company should also be able to accommodate the mobile. For example, http://m.bbc.co.uk/news is the BBC News mobile site.

The site is more compressed having a perfect design, and navigation features which help the user to view the site from a small screen on a mobile. Despite the fact that one could download a BBC News app, there still has to be a mobile website version which could entertain the user when the user lands on it from a search engine or another site.

7.6.2 Metrics: Defining Internet Units of Measurement

The **conversion optimization**, or **conversion rate optimization** (CRO) is the method of creating an experience for a website so that there is an increasing percentage of visitors getting converted into customers. This could be done by showing a particular campaign. The online marketing response rates will change form hour to hour, and offer to offer.

The same has a lot of difficulty as it is difficult to segregate humans by the chance events from real effects. The haystack process helps marketers to examine and draw conclusions from small samples of data. Also psychologists like Kahneman and Tversky have documented tendencies which found variant patterns in small samples, and examined the poor decisions of consumers. The statistical methodologies can be used to study large samples and judge the results, and to see patterns of behaviour after visiting a website.

Google Analytics could help monitor mobile usage for the site. It can analyse the mobile behaviour data and reveal how well the mobile content engages the audience.

This could also help mobile conversion data that could show whether or not some of the key landing pages still need to be optimized for mobile browsing. One could add the 'Device Category' field to the 'Site Content' dashboard which displays the quantity and quality of the mobile traffic to each individual page on the company's site.

The table on the 'Site Content' dashboard also includes the metrics such as page views and bounce rate. One could also add a 'Device Category' by going to the 'Secondary dimension' menu which is above the first column and selecting 'Device Category' from the 'Users' submenu. The table will display the most-viewed pages on the company's site, for every device, and thus one could compare the mobile and web traffic.

This information could help assessing which search queries lead the mobile traffic to the company's site, and what content the mobile audience would be most interested in, and which pages have to be optimized for mobile browsing first.

When one monitors the website with free tools, like Google Analytics and paid tools, like Adobe/Omniture and Webtrends, one can access the wealth of data. This data can help the company decide the traffic of the users on PC versus tablet versus mobile phone traffic.

This data can show the audience who operate on mobiles with the breakdown of mobile devices by operating system, type, and screen resolution. Analytics will provide demographic information like country, age, language, and location for the users on mobile and PC.

One could use analytics to track the behaviour of mobile users and compare the same to the PC users. The main parameter of the audience which have to be analysed are the Peak times for visits, Page views per visit, Length of visits, Sources of entry, popular pages, navigation from one page to the other and the Point of exit.

The company could also set up 'events' which could monitor conversions like purchases, sign-ups, and calls. The Analytics could highlight pages which are slow to load on a mobile device.

Heatmap tools such as ClickTale help analyse how visitors interact with the company's site.

Tools like Crazy Egg could be used for exploring where users click and how do they scroll, segmenting that data on the basis of the number of facets, which also includes the device type. This tool can show users' clicks irrespective of whether the same is actually clickable.

Thus, one can make out what the users actually did. This could help to modify designs which meet the user expectations and enhance the call-to-actions.

It has been found that a simple icon on the site which is not clickable needed to be clicked, as a heavy percentage of users were ignoring the right icon and clicking on the inactive icon.

A/B and multivariate testing could help the companies to test what works best for links icons or text. In this type of analysis, half the users are shown the original page and half of them are shown the changed page.

A number of tools can be used for A/B testing. The tools could be integrated with heatmaps for better insight. The A/B and multivariate testing could prove the mobile marketing initiatives as it can utilize web analytics to highlight the key pages which are popular with mobile visitors. It could also highlight the pages which are slow to load and could have mobile usability issues.

It would be crucial to make these pages mobile-friendly by reducing the image sizes, making links clickable, using legible font, which is easy to tap, and formatting the content into a single column. The company could also inculcate click-to-call/email/navigate features on the landing page.

Optimization is a term used for the appropriate use of the resources so that the cost incurred in it is minimum and returns be maximum. The companies going for website marketing also want this optimization. For the same, many tools are available which have been discussed here for measuring the effectiveness of the e-marketing tools.

We will discuss the concept of metrics broadly in terms of customer and web metrics.

A. Customer Metrics

The following are some of the crucial elements related to customer metrics:

Acquisition cost by campaign

Acquisition cost or the **Cost Per Action** or **Pay Per Action** is the online advertising pricing model, in which the advertiser pays for each specified action (like the purchase, a form submission, etc.) linked to the advertisement. This is one way of measuring acquisition cost by campaign.

E-Customer Behaviour Metrics

Many a E-Customer Behaviour Metrics like the Number of visits ,Number of unique visitors during month ,Total unique visitors acquired by site, Frequency of visit, Total number of minutes viewing all pages, Duration of visits in each page, reach and Monthly Stickiness can be measured by the E-customer behavior metrics.

Lifetime Value of Customers

Customer lifetime value (CLV) or lifetime customer value (LCV), or user lifetime value (LTV) is a prediction of the net profit attributed to the entire future relationship with a customer.

Monthly Customer Metric Tracker

Monthly Customer Metric Tracker uses parameter like Acquisition which includes Visitor acquisition cost and New visitor momentum. The second is **Conversion, which includes** New customer acquisition cost, New customer conversion rate and New customer revenue momentum and lastly **Retention which includes** Repeat customer maintenance cost, Repeat customer revenue momentum and Repeat customer conversion rate.

E-mail/direct metrics

E-mail metrics includes metrics like:

- **Open rate:** Open rate represents the percentage of delivered emails that are opened by recipients. This could be inferred if images are enabled or a link within the email is clicked.

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- **Click rate:** Measured in both HTML and text-only emails, click rate provides a way to evaluate recipient engagement with an email.
- **Bounce rate:** Bounce rate represents the percentage of sent messages that cannot be delivered. Bounces can either be hard or soft.
- **Personalization**: Personalization is a common technique to capture readers' attention by making the email unique to them.
- **Subject line:** Recipients glance at each subject line for only a couple seconds before deciding whether or not to open an email.

Banner metrics

Banner Metrics includes measuring factors like Average Acquisition, Total Cost of Click, Number of Click, Cost Per Average Conversion, Cost per Site Names Category, Impressions Throughs, Orders Revenues Through, % Click-through Order Rate Order, etc.

Promotional metrics

Promotional metrics includes metrics like:

- **Acquisition Cost:** The acquisition cost calculation shows the value of a given promotional effort over a given period of time.
- **Cost per conversion:** This is the number that marketing people use to determine the best investment of their promotional budget.
- **Net Yield:** This determines the effectiveness of a multi-step process where incremental costs are not available, such as creative/banner testing or the comparison of two paths leading to the same goal.

B. Web Metrics and Analytics

Web analytics can be said to be the collection, measurement, analysis and reporting of internet data for purposes of understanding and optimizing web usage. The same is done without the permission of the user, with the third party cookies that are shared between different web sites .this could also be a breach of privacy.

Web analytics is a tool for business and market research which is crucial to assess and improve the effectiveness of a web site. The web metrics can be studied from off-site and on-site perspectives.

1. Off-site web analytics technologies

The main off-site web analytics technologies are as follows:

- Log file analysis, that reads the logfiles in which the web server has recorded the transactions.
- Page tagging which utilizes the JavaScript or images for notifying a third-party server in case a page is connected to the web browser.

Let's see what each of these concepts mean:

- **Web server logfile analysis**

Web servers record the transactions in a logfile. The logfiles can be read by a program to provide data for the popularity of the website. This needs a web log analysis software.

- **Page tagging**

This is related to the accuracy of logfile analysis with caching, so that the web analytics could be performed as an outsourced service which bring in second data collection method, page tagging or 'Web bugs'.

Both logfile analysis programs and page tagging solutions are used for web analytics.

Hybrid methods

Many companies now go in for collection of data through both logfiles and page tagging. This gives more accurate statistics.

Some of the other methods are:

- **Geolocation of visitors**

The IP geolocation, can track visitors location. The same is done by using an IP geolocation database or API, which can geolocate the visitors to a city, region or country level.

IP Intelligence, or Internet Protocol (IP) Intelligence, would be the technology that maps the Internet and segregates the IP addresses by factors like connection type proxy information, geographic location (region, country, state, city and postcode, Internet Service Provider (ISP), and more.

- **Click analytics**

Click analytics is a special type of web analytics which lays stress on the clicks.

The editor of a web site will use the click analytics to see the performance of the particular site, with the number of users clicking at the site

The same could be seen real-time or 'unreal'-time, based on the type of information sought.

- **Customer lifecycle analytics**

Customer lifecycle analytics can be said to be a visitor-centric approach which measures the falls of the lifecycle of marketing. The page views, clicks, API calls, access to third-party services, can all track a visitor.

Customer lifecycle analytics connects all the data points into a marketing funnel which is a portrayal of the visitor behaviour.

2. On-site web analytics technologies

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The main bodies having studied this area of web analytics are JICWEBS (The Joint Industry Committee for Web Standards in the UK and Ireland), The WAA (Web Analytics Association, US) ABCe (Audit Bureau of Circulations electronic, UK and Europe)and IAB (Interactive Advertising Bureau). The visitor statistics could be gained by using the metrics like.

- **Hit** - A request for a file from the web server. This would be available with the log analysis. The number of hits received by a website could judge its popularity, at the same time this could be extremely misleading and could over-estimate the popularity of the website.
- **Page view** - A request for a file whose type is defined as a page in log analysis. This would be a script being run in page tagging. In log analysis, a single page view may generate multiple hits as all the resources required to view the page (images, .js and .css files) are also requested from the web server.
- **First Visit / First Session** – This is the 'Absolute Unique Visitor' who hasn't made any previous visits to the website.
- **Visit / Session** - A visit could be said to be the series of page requests from the same uniquely identified client with a gap of less than 30 minutes between each page request. A session ends when someone goes to another site or it takes more than 30 mins to review another whichever comes first.
- **Unique Visitor / Unique User** – This would be a uniquely identified client who generates requests on the web server (log analysis) or viewing pages (page tagging) in a said time period (like Sundays). The same person visiting from two different computers will be counted as two Unique Visitors.
- **Impression** - An impression is each time an advertisement loads on a user's screen like a banner.
- **Repeat Visitor** – This would be a visitor who has made at least one previous visit. The period between the last and current visit is called visitor recency and could be judged in days.
- **Singletons** - The number of visits where only a single page is viewed.
- **% Exit** - The percentage of users who exit from a page.
- **Visibility time** - The time a single page is viewed.
- **Bounce Rate** - The percentage of visits where the visitor enters and exits at the same page without visiting any other pages.

- **Session Duration** - Average amount of time that visitors spend on the site each time they visit.
- **Click path** - The sequence of hyperlinks one or more website visitors follows on a given site.
- **Page View Duration / Time on Page** - Average amount of time that visitors spend on each page of the site.
- **Page Depth / Page Views per Session** - Page Depth is the average number of pageviews a visitor consumes before ending their session.
- **Active Time / Engagement Time** - Average amount of time that visitors spend actually interacting with content on a web page, based on mouse moves, clicks, hovers and scrolls.
- **Frequency / Session per Unique** - Frequency measures how often visitors come to a website. It is calculated by dividing the total number of sessions (or visits) by the total number of unique visitors.
- **Site Overlay**- It is a technique in which graphical statistics are shown besides each link on the web page. These statistics represent the percentage of clicks on each link.
- **Click** – It 'refers to a single instance of a user following a hyperlink from one page in a site to another'.

Monitoring e-Marketing Activities

Let's have a brief overview of what entails the monitoring of e-marketing activities.

User surveys and usability testing

It is important to understand the consumer by knowing why he visits your website, then on the company can plan marketing campaigns which are successful and likely invest more money**.**

Usability testing are a close-up look at the individual customer experience, which includes the verbal and facial expressions when the user is navigating about the pages of your site. Traditional usability lab setups are costly, require time are cumbersome, and need staffing resources which e-com-merce retailers simply cannot invest. Thus, the usability testing has been limited by many barriers.

Tracking and site analysis tools

Many suppliers sell tracking tools which inform the company where visitors come from, what they do and where they go form the website.

The user who access the server hosting the website will also have access to a log file which is a recorded history of all requests for pages on the site. The same will include the page requested, time and source of the request. The log file but

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grows so quickly that one needs a software to get anything useful from it. Thus, a software is used to measure the usage patterns of the site. It does this using statistics such as the total number of visitors, the number of new and returning visitors, which search engines they are finding the site through, and which parts of the site they are making particular use of.

Tools like Analog, Usage, WebTrends and Google Analytics could do the same on the web. On could also use the webmaster tools shown by various search engines to gain a better understanding of how search engines rank the website.

Check Your Progress

8. What are the transactional campaigns?
9. Define conversion rate optimization (CRO).
10. List some of the main parameters for tracking the behaviour of mobile users and PC users.
11. What is customer lifetime value?

7.7 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. Doing business in cyber space is advantageous to retailers in many ways, It reduces labour costs and helps avoid expenditure on paperwork and merchandising. It is a known fact that online transaction costs are lower.
2. Professional Internet marketers will ensure that your business or firm appears right on the top of important search engines and directories. A part of the role of a professional Internet marketer is to make the website design user-friendly, optimize the search engine, optimize the structure of the website, optimize keyword, etc.
3. Viral marketing is an idea that spreads and while it is spreading, it helps to market your business. It is a phenomenon that encourage people to pass on a marketing message.
4. The four ways of personalization in internet marketing are: greetings, customization, narrowcasting and recommendation.
5. The two components of website design are front end and back end.
6. An FTP program enables operators to upload scripts, set file permission, create folders and transfer files to and from a server.
7. Originally called LiveScript, JavaScript was developed by Netscape.

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8. Transactional Campaigns refers to the campaigns in which whenever the customer makes an in-app purchase, or changes their password, there could be an automatic email or other message which could be set up to confirm their action. It has been observed that open rates are twice as high for transactional emails. Thus, the messaging communicates the brand values and is coordinated with other campaigns.
9. The conversion optimization, or conversion rate optimization (CRO) is the method of creating an experience for a website so that there is an increasing percentage of visitors getting converted into customers.
10. One could use analytics to track the behaviour of mobile users and compare the same to the PC users. The main parameter of the audience which have to be analysed are the Peak times for visits, Page views per visit, Length of visits, Sources of entry, popular pages, navigation from one page to the other and the Point of exit.
11. Customer lifetime value (CLV) or lifetime customer value (LCV), or user lifetime value (LTV) is a prediction of the net profit attributed to the entire future relationship with a customer.

7.8 SUMMARY

- Traditional marketing operates on the basis of the four PS, that is, the correct marketing mix of the product, price, promotion and placement.
- The challenges of traditional marketing include expensive product, lack of consumer interaction and lack of coordination.
- The term internet marketing is interchangeably used for Web marketing, e-marketing, internet advertising or online marketing. The wide availability of the World Wide Web allows businessmen across the world access to millions of potential customers.
- There are many types of online/ internet marketing: pay per click, SEO, internet auctions, affiliate marketing, banner advertising, directory listings, ethical e-mail marketing, viral marketing, etc.
- While designing a website, a company may have many objectives in mind. The needs of the website visitors must be met after doing extensive research on consumers.
- Internet or online marketing has its positive as well as negative aspects.
- One cannot build an intelligent website that optimally has all sources of information for an online company, overnight. Actually, it is a long process that requires significant investment in technology, and an accumulation of knowledge that can come only with experimentation and trial and error.

Website intelligence leverages four types of information. And there are certain steps that e-commerce companies typically follow in leveraging their information.

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- Before creating a web page, it is important to decide the goals, objectives, and overall purpose of the e-commerce website. Without these, the website may not have the focus it needs to be successful.
- There is a lot of competing content, which has to catch attention, develop trust, and meet customer expectations for the company. E-commerce messages could take a variety of forms and could fulfill a number of purposes. This could be from promotions to transaction, activity messages, consistent and personalized customer experience etc.
- The company should have a customer-friendly website. The rise in web traffic along with Google's mobile-friendliness ranking factor makes it necessary for the brand's site to adapt the website to devices for staying competitive.
- The conversion optimization, or conversion rate optimization (CRO) is the method of creating an experience for a website so that there is an increasing percentage of visitors getting converted into customers. This could be done by showing a particular campaign. The online marketing response rates will change form hour to hour, and offer to offer.
- The following are some of the crucial elements related to customer metrics: Acquisition cost by campaign: E-Customer Behaviour Metrics, Lifetime Value of Customers, Monthly Customer Metric Tracker, E-mail/direct metrics, Banner metrics, and Promotional metrics.
- Web analytics can be said to be the collection, measurement, analysis and reporting of internet data for purposes of understanding and optimizing web usage. The same is done without the permission of the user, with the third party cookies that are shared between different web sites .this could also be a breach of privacy. Web analytics is a tool for business and market research which is crucial to assess and improve the effectiveness of a web site.
- Usability testing are a close-up look at the individual customer experience, which includes the verbal and facial expressions when the user is navigating about the pages of your site. Traditional usability lab setups are costly, require time are cumbersome, and need staffing resources which e-com-merce retailers simply cannot invest. Thus, the usability testing has been limited by many barriers.
- Many suppliers sell tracking tools which inform the company where visitors come from, what they do and where they go form the website.

7.9 KEY WORDS

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- **4 Ps of marketing:** The right marketing mix of product, price, promotion and placement
- **Internet marketing:** Also called Web marketing, online marketing or e-marketing, it involves marketing of products on the Internet so that the business is promoted to a larger audience, spread across the globe.
- **Search engine optimization:** Referred to as SEO, it is an activity that helps make websites more search-engine friendly.

7.10 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short-Answer Questions

1. What are the challenges faced by traditional marketing?
2. List the types of internet marketing.
3. Write a short note on the needs of website visitors.
4. List the four types of information which Website intelligence leverages.
5. Write a short note on the advantages of a Website.
6. Briefly explain the corporate strategic infrastructure required for website designing.
7. Write a short note on maintaining a website for e-commerce.

Long-Answer Questions

1. Discuss the advantages and disadvantages of internet marketing.
2. Explain the steps involved in leveraging of information by e-commerce companies.
3. Describe the technology infrastructure required and basic web languages for web designing.
4. Explain some of the most common mobile marketing forms.
5. Discuss, in detail, the concepts of customer and web metrics.

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UNIT 8 E-SECURITY

Structure

8.0 INTRODUCTION

E-commerce security are the basic principles which will guide the safe electronic transactions. This is one domain which helps in the secure buying and selling of goods on the Internet. This is because the online business depends on the customers' trust, that the company's website is a secure place to visit and transact on. Online security also involves saving the company's content, documents, software running on the website from hackers and competitors. For the same the company might need a copyright for its content. In this unit, you will learn about the different aspects of e-security relevant to business in e-commerce.

8.1 OBJECTIVES

After going through this unit, you will be able to:

- Explain the concept of security on the internet
- Discuss the types of network and website security risks
- Describe the vulnerability of internet sites
- Explain the protection methods using for network and website security
- Discuss the e-business risk management issues

8.2 NETWORK AND WEBSITE SECURITY RISKS

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In this section, you will learn about the security risks associated with network and websites.

8.2.1 Security on the Internet

As mentioned in the introduction, security on the internet for a business can be of many different types. The domain name is a security issue for the company running and e-business. The domain names competition is another legal issue. The Internet addresses are called the domain names. The top-level name would be the *qburst.com* or *microsoft.com*. The second level name would be *qburst.com/blog.* Several companies could get similar names and could get the same domain name. Leading to problems of Cybersquatting, that is the practice of registering domain names so as to sell at higher prices is also to be solved by the company.

ICANN is a private, nonprofit California corporation formed in 1998 and delegated authority by the United States Department of Commerce to manage the domain name system (DNS). The Domain names could be said to be the familiar territory. Internet commerce need the governance of ICANN—the Internet Corporation for Assigned Names and Numbers and is concerned with the management of the Internet domain name system. ICANN also acts on important issues affecting the rights of intellectual property owners online. It coordinates the allocation and assignment of IP addresses (the "Numbers" part of its name), determines how the domain names associated with those numbers are distributed (the "Names" part), and makes sure that no two numbers or domain names are identical

E-businesses has the issue of using the log files. The log file would mean turning the log data into application service that could get relevant information from files in-house. Also, the cookies raise some privacy concerns. For the same there are software like Privacy Guardian, My Privacy, etc.

A **patent** is a form of intellectual property. This is a set of exclusive rights which are granted by a sovereign state to an inventor or their assignee for the exchange for the public disclosure of an invention.

The same could vary widely among countries according to national laws and international agreements. The patent application has to have one or more claims defining the invention that could meet the patentability requirements like novelty and non-obviousness. The exclusive right granted to a patentee would be the right to prevent others from making, using, selling, or distributing the patented invention without permission.

The copyright laws protect Intellectual property and thus cannot be used freely. In E-Commerce protecting the IT laws is very difficult. Like the company could buy software which one has the right to use but could not distribute it. The

distribution rights might be with the copyright holder. The copying contents from the website is also a form of the copyright laws.

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The license means to give permission. A license may be granted by a party ('licensor') to another party ('licensee') with the agreement among the two parties. This could be said to be 'an authorization (by the licensor) to use the licensed material (by the licensee).

A trade secret could be said to be a formula, design, instrument, practice, process, pattern, or compilation of information which is not yet known, by which a business can obtain an economic advantage over competitors or customers. This could also be called the 'confidential information', but not the 'classified information'.

Data ownership could be the possession of and responsibility for information. The Ownership means the power as well as control. This control of information will entail the ability to access, package, create, modify, sell or remove data, derive benefit from, and the right to assign the privileges to others.

8.2.2 Client-Server Security Threats

Client-server security ensures that only authorized users can access the information. Such mechanisms include password protection, encrypted smart cards, biometrics and firewalls. Following are the security problems in a client–server environment:

1. **Physical Security:** This is a common problem which is caused by an unauthorized user, say a hacker, who gains physical access to computers by guessing the passwords of the various users.
2. **Software Security:** A software security breach occurs when programs/ software are compromised and made to execute operations which they should not legally be doing.

   Example: The rlogin hole in the IBM RS-6000 workstation, which enables a cracker to create a root shell or super user access mode, can be used to delete an entire file system or a password file or create a new account.
3. **Inconsistent Usage:** A security lapse of this nature is caused by the assembling of a combination of hardware and software by a system administrator. Due to the increasing complexity of software, such type of assembling is a growing problem and compromises the security of any system.

Client–server security threats are largely divided into two categories:

- Threats to client
- Threats to server

1. Threats to clients

Client threats mostly arise from malicious data or code, malicious code being viruses, worms and Trojan horses.

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- **Virus:** A virus is a code segment that replicates by attaching copies of itself to existing executable (EXE) files. The new copy of the virus is executed whenever a user executes the host program. Every virus does a different thing; one virus may display some particular text string on the monitor while another may delete all files on a hard disk on a particular date.
- **Worm:** A worm is also a self-replicating program but it differs from a virus in that it does not require any host program. Clients must regularly scan for malicious data and executable program fragments that are transferred from the server to the client. Examples of worms include VBS/Loveletter and Happy99.
- **Trojan Horse:** This is a program that performs a desired task as well as other unexpected functions. An example would be an editing program for a multi-user system that could be modified to randomly delete another user's file(s). Examples of a trojan horse would include BackOrifice, VBS/Freelink and Backdoor G.

2. Threats to servers

Threats to servers include:

- Unauthorized eavesdropping
- Denial of services
- Modification of incoming data packets

(a) Eavesdropping

Hackers can use electronic eavesdropping to trap user names and unencrypted passwords sent over a network. Encryption can prevent eavesdropping on data travelling over unsecured networks.

(b) Denial of services

A 'denial of service' attack is a type of security threat wherein legitimate users are prevented from using a particular service to the deliberate actions of attackers. Examples of such a threat are:

- Preventing legitimate traffic on a network by flooding it
- Preventing access to a service by disrupting a server by sending more requests than the server can handle
- Preventing a particular individual from accessing a service
- Disrupting service to a specific system or person

Services can be denied by service overloading or message overloading

– ***Service overloading:*** You can easily overload a web server by writing a small looping program to send requests continually for a particular file; for example, to display a home page.

– ***Message overloading:*** This happens when someone sends a very large file to a message box every few minutes. The message box rapidly grows in size, soon occupying all the space on the disk. The repeated receiving process on the recipient's machine can cause the disk to crash.

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(c) Packet modification

This is an integrity threat that involves modifying or destroying a message packet.

IP Spoofing: Internet Protocol is the elementary protocol which sends data over the internet and other computer networks. The header of each packet that is to be transmitted contains the source and destination addresses – called IP addresses. An IP address would look like this: 192.30.233.0

The creation of an IP packet with a copied IP source is called IP address spoofing. In such a case, the intention is to disguise the sender's identity or to impersonate another computing system. It is one among the many common forms of online disguises. How it works is that an attacker spoofs the IP address of a sender's machine and then sends a malicious message. Since this appears to have come from a trusted machine, an attacker thereby gains unauthorized access to a computer or a network.

8.2.3 Vulnerability of Internet Sites and Business Policies

Internet sites are prone to internet fraud. The trend for fraud has grown even faster than the Internet. Thus, the chances of crime over the internet, in cases like the buyers and sellers not knowing each other, are increasing.

E-commerce fraud came up with increasing websites. This is crucial for the cyber and click-and-mortar merchants. Also, the websites have many auctions conductive to fraud, by the sellers and buyers. There are ample of e-mails and pop up ads which have helped the financial criminals to access personal account details of the customers. Also, the phantom business opportunities and bogus investments are crucial frauds. Security features like the authentication, escrow services and the non-repudiation could protect the company in e-commerce.

It is assumed that the Websites of reputable companies will never lie. Thus, an ad on the web or information on the web has to prove what they say and thus justify their own corporate counsel and that the information goes through web approval committees along with many regulating bodies.

Here, many different government agencies play a governing role looking over our shoulder, which means the cost of being caught and the cheating would be too high. Also, the individuals in the company have to be able to look in the mirror with honesty.

Thus, the e-marketing needs the e-business legal protection for the company marketing through the e-marketing network along with customers who purchase through the net.

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There are many policies that are very important when we deal with the company's needs of creating a business contract. Many obligations could carry criminal penalties pertaining to the firm and its legalities. These polices include certain business contract laws which also have in them many of the federal and state laws. All these are important to the firm's business. Thus, it is important for the company to pertain to the policies and procedure in such a way that all the legalities of the business contract are fulfilled.

This is important because if the policies are not in sync with the law, this may lead to criminal violations of the law for the firm. It is the duty of the firm to bring in any suspected policy and procedure violations to the right and responsible authorities. This will lead to the right rectification and investigation in case of any business contract violation. This is also true as a business contract is an official agreement between two parties which no one should be breaching.

The firm has to make sure that it has the right internal policies and procedures with are in such with the applicable laws of business contract. This also entails in it keeping the right ethical standards in the working environment of the firm. It is crucial that the top management also comply to the listed and made policies and procedures, and also that all of them should be responsible and accountable to this compliance. It is important that the firm's directors also communicate important business contract policy among the juniors. Any doubts of the same should also be cleared when forming these policies and procedures.

Now that you have learnt about the risk associated with networks and websites and the manner in which it can managed. In the following section, you will learn about the measures which are such risks and its management in the e-commerce setting.

Check Your Progress

1. What is a trade secret?
2. Which type of a client-server threat is a trojan horse?

8.3 NETWORK AND WEBSITE SECURITY

As the e-commerce scenario is changing, it is opening up new internet security challenges being faced by many organizations. Conducting business transactions over the internet (online) has always been a risk. It's a world of unforeseen traps, with vulnerabilities and threats manifesting themselves in the least expected place, at the least expected hour.

These challenges are required to be addressed by framing appropriate security policies, application of the controls and regular review and monitoring of the controls to ensure organization's information in protected. The Vulnerability

Assessment and Penetration Testing Services (VAPT) audits need to be carried out periodically to ensure compliance to the set policy and the controls and adequacy of these controls to address all types of threats.

Jurisdiction would be the practical authority granted to a formally constituted legal body or to a political leader to deal with and make pronouncements on legal matters and, to administer justice within a defined area of responsibility. The same also denotes the geographical area or subject-matter in which the given authority applies. Web Jurisdiction brings its substance from conflict of laws, public international law, constitutional law and the powers of the executive and legislative branches of government to allocate resources to best serve the needs of its native society. This also applies to the world of e-commerce.

The increase of E-commerce fraud can be said to be increasing with the rise of websites. This is crucial for the cyber and click-and-mortar merchants.

Network and company's website security is very crucial for the company. The same can be built by Security audits and Penetration testing.

Vulnerability Assessments are a process of identifying, quantifying, and prioritizing vulnerabilities in a system. A vulnerability refers to the inability of the system to withstand the effects of a hostile environment.

Penetration Tests are a method of evaluating computer and network security simulating attacks on a computer system or network from external and internal threats. They are usually defined by a given test objective.

8.3.1 Firewall

Firewall is a mechanism to provide limited access to machines either from the outside world to internal internet or from internal world to outside world. By, providing these security mechanisms, we are increasing the processing time before one can access a machine. So, there is a trade-off between security and ease of use. A firewall partitions an internet into two regions, referred to informally as the inside and outside.

Security Lapses

- **Vulnerable Services - NFS:** A user should not be allowed to export certain files to the outside world and from the outside world also, someone should not be allowed to export our files.
- **Routing based attacks:** Some kind of ICMP message should not be allowed to enter my network. For e.g., Source routing and change route ICMPs.
- **Controlled access to our systems:** For example, mail server and web pages should be accessible from outside, but our individual PC's should not be accessible from the outside world.
- **Authentication:** Encryption can be used between hosts on different networks.

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- **Enhanced Privacy**: Some applications which are potentially threatening should be blocked.
- **PING & SYN attack:** Since these messages are send very frequently, therefore you won't be able to do anything except reply to these messages. So, it should not be allowed these messages to enter my network.

So, whatever is provided for security is called Firewall. It is a mechanism and not just a hardware or software.

Firewall Mechanisms

Let's discuss some of the mechanisms used for firewall.

1. **Network policy:** Here, we take into consideration, what services are allowed for outside and inside users and the services which are allowed can have additional restrictions. For e.g., I might be allowed to download things from the net but not upload, that is some outside users cannot download the things from our net. Some exceptional cases might be there which have to be handled separately. And if some new application comes up then, we choose an appropriate network policy.
2. **Authentication mechanism:** An application can be designed which asks for a strong password for authentication, so that unwarranted access and logins are prevented.
3. **Packet filtering:** Routers have information about some particular packets which should not be allowed. Many commercial routers offer a mechanism that augments normal routing and permits a manager to further control packet processing. Informally called a *packet filter,* the mechanism requires the manager to specify how the router should dispose of each datagram. For example, the manager might choose to *filter* (i.e. block) all datagrams that come from a particular source or those used by a particular application, while choosing to route other datagrams to their destination.

   The term *packet filter arises* because the filtering mechanism does not keep a record of interaction or a history of previous datagrams. Instead, the filter considers each datagram separately. When a datagram first arrives, the router passes the datagram through its packet filter before performing any other processing. If the filter rejects the datagram, the router drops it immediately.
4. **Application gateways or proxy servers:** These are used at the application level to protect the computers working behind the firewall. Here, when the client in order to connect with the destination service is connected with a proxy server which negotiates the packets and information on the destination service provider's behalf. Thereby, two connections are created here, one between the client and the proxy server and second, between the proxy server and the destination service.

8.3.2 E-Business Risk Management Issues

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One of the most important risk management tasks for an e-commerce company is handling the confidentiality of information that the contract entails. This should be separated from the directors and his decisions of the same. Many information contained in the businesses contract like that related to the customers, suppliers, competitors and other directors should be kept confidential unless they have to be disclosed to a known authority.

Also, there should be a service level agreement is a document, which defines the relationship between two parties: the provider and the client.

This is clearly an extremely important item of documentation for both parties. If used properly, it should:

- Identify and define the needs
- Provide a framework for understanding
- Simplify complex issues
- Reduce areas of conflict
- Encourage dialog in the event of disputes
- Eliminate unrealistic expectations

Specifically, it should embrace a wide range of issues. Amongst these are usually the following:

- Services to be delivered
- Performance and Monitoring
- Tracking and Reporting
- Problem
- Management Review
- Legal Compliance and Resolution of Disputes
- Customer Duties and Responsibilities
- Security
- IPR and Confidential Information
- Termination
- Policy and Approvals
- Quality Control

Many internal policies or email etiquettes are also important for any company. Email is considered to be a genuine and legal tool of official communication. Here again, it is very important for the firm to consider it as a relevant as a written document.

Any sort of official email communications in a company can be done to fulfill the information and administrative needs of the firm and also to communicate

to the employees the data sooner than direct communications. This is a very crucial way of employees' communication for the official business which might be very important for the operation and function in the firm.

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It is very important that each department as a policy for email have a head who has the authority to filter and use and authorize email to be sent to mass employees or say within the restricted department or personnel.

Each employee, as per policy of the firm, should have his own email account. Also, the account should not be accessible to all but the employee only.

All the address of the employees should be present in an official email account along with a well-planned procedure of centrally maintained database. The access of this should but be restricted to only a few personnel.

It is important for the success of this medium that the employees are given instructions to check their email regularly on a routine basis to maintain the communications. In case some of the employees have not been given an email, then some other mode of official communications should be done for them to keep them also in the loop.

In case any employee has to redirect a mail form the official email account to another firm or a company outside the firm, then it will be done only at their own initiative and risk. The responsibility of the consequence of any such mail should be solely theirs. In this case the employees should be held responsible as a policy matter not only to the firm but also the external party to whom the mail has been sent. In any case email is a form of a legal paper like any written letter.

It is important as a policy of the firm that any electronic communication do take care to comply to the country's federal and state laws. Also, the email communication should compel to the firms' set policies and procedure too.

Document retention is equally important for any business contract. The fact that the firm is already working on the set terms is not enough a reason to discard the document under consideration. Thus, it is equally important to document the processes, tasks, and events as is to do them in a right manner. Thus, it is important to understand as to what the aims of documentation are also in case, we are doing it is crucial to do it right.

Many academicians have talked about document retention specially the policy and procedure manuals which do take into account on paper the business essentials which could mainly be the accounting, human resources, IT, sales in them. These documents are important as they entail the important research, writing and organizing and some of the most valuable and confidential content of the firm.

Many organizations do see many a types of document processing software for the same.

It is very crucial to retain the existing documents. Also, it is crucial to see that the document is retained at the accurate and up-to-date level. It is also important that the right version is also used to that the authenticity of the documents is retained.

Many important objectives are fulfilled by retaining important documentations. Some of them have been given below:

- The communication of ideas, concepts, requirements, to the employees along with the top, managers, and junior employees;
- The document lists the key responsibilities;
- Proper documentation brings in a consistency and repeatability among the firm's policies and procedures.
- Documentation is an assurance that our action re our own responsibility in the firm.
- They give very vital information for the business plans be it short or long term;
- They help us see to the right requirements be that of the customers, regulations, standards or the legalities of the country.

This but has some cost attached to it. For example, documenting is a time-consuming procedure. Also, it is a task which has to be done continuously while keeping documents and records which is again time consuming. It is also important that a resource of the company be able to maintain consistency, order, security, and availability of the right and vital company documents. The documentation of procedure can be done after the major function of the firm. After the policies-and-procedures is done, the firm adds on the number of documents that has to be maintained and retained in the firm.

8.3.3 Defining Enterprise Wide Security Framework

You have seen in the previous section how policies play an important role in communicating important information directives with regards to the functioning in the companies. But when it comes to Information Technology, these polices become slightly problematic, given the case that they become outdated and harder to maintain with rapid changes in the field of information sciences.

The Enterprise Security Architecture System (ESAS) was developed by Price Waterhouse Coopers to combat this problem. The ESAS is primarily built upon the People, Policy and Technology (PPT) methodology.

The PPT methodology can be depicted in the form of the venn diagrams showing the controls as three core elements.

The 'People' element deals with defining the roles and responsibilities of the staff in the organization. These define the execution of services by different levels of staff including management, users, auditors, security administrators, etc.

The 'Policy' element is concerned with vision statements, policies, standards, and documentation dealing with security related issues.

The 'Technology' element deals with the core technologies which are involved for ensuring security and their monitoring including operating systems, databases, tools, etc.

If the issue is broken down into the three core elements, action items can be determined for each core element. In this manner, control coverage can be moved from one element to two, and ultimately to coverage by all of the elements.

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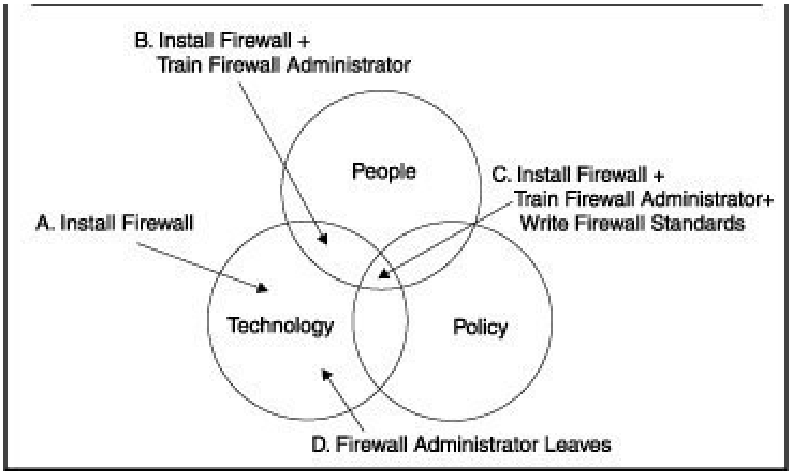


Fig. 8.1 *Internet Connection: Coverage by Three Elements*

Check Your Progress

3. What are penetration tests in network security?
4. What are used to protect the computers working behind the firewall at the application level?
5. Who developed the ESAS?

8.4 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. A trade secret could be said to be a formula, design, instrument, practice, process, pattern, or compilation of information which is not yet known, by which a business can obtain an economic advantage over competitors or customers. This could also be called the 'confidential information', but not the 'classified information'.
2. A Trojan horse is a type of threat to client under the client-server threats.
3. Penetration Tests are a method of evaluating computer and network security simulating attacks on a computer system or network from external and internal threats.
4. Application gateways or proxy servers are used at the application level to protect the computers working behind the firewall.
5. The Enterprise Security Architecture System (ESAS) was developed by Price Waterhouse Coopers.

8.5 SUMMARY

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- E-Commerce security are the basic principles which will guide the safe electronic transactions. This is one domain which helps in the secure buying and selling of goods on the Internet. This is because the online business depends on the customers' trust, that the company's website is a secure place to visit and transact on. Online security also involves saving the company's content, documents, software running on the website from hackers and competitors. For the same the company might need a copyright for its content.'
- Client-server security means that only authorized users can access the information. The Client-server security threats are largely divided into two categories: threats to clients and threats to servers.
- Threats to clients include virus, worm and trojan horse, whereas threats to servers include unauthorized eavesdropping, denial of services and modification of incoming data packets.
- As the e-commerce scenario is changing, it is opening up new internet security challenges being faced by many organizations. Conducting business transactions over the internet (online) has always been a risk. It's a world of unforeseen traps, with vulnerabilities and threats manifesting themselves in the least expected place, at the least expected hour.
- The Vulnerability Assessment and Penetration Testing Services (VAPT) audits need to be carried out periodically to ensure compliance to the set policy and the controls and adequacy of these controls to address all types of threats.
- Firewall is a mechanism to provide limited access to machines either from the outside world to internal internet or from internal world to outside world. By, providing these security mechanisms, we are increasing the processing time before one can access a machine. So, there is a trade-off between security and ease of use.
- Some common firewall mechanisms are network policy, advance authentication mechanism, packet filtering, application gateways, etc.
- The Enterprise Security Architecture System (ESAS) was developed by Price Waterhouse Coopers. The ESAS is primarily built upon the People, Policy and Technology (PPT) methodology.

8.6 KEY WORDS

- **Log file:** It is a file that records either events that occur in an operating system or other software runs, or messages between different users of a communication software

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- **Virus:** It refers to a code segment that replicates by attaching copies of itself to existing executable files
- **Denial of service attack:** It is a type of security threat wherein legitimate users are prevented from using a particular service to the deliberate actions of attackers
- **Firewall:** It is a mechanism to provide limited access to machines either from the outside world to internal internet or from internal world to outside world

8.7 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short-Answer Questions

1. What are some of the security problems in a client-server environment?
2. Write a short note on some different types of security threats to businesses.
3. Briefly explain the security lapses which raises the requirement of firewall.
4. What is the PPT methodology behind ESAS?

Long-Answer Questions

1. Discuss the different client-server security threats.
2. Examine the elements, issues and aspects of E-Business risk management.
3. Describe the major firewall mechanisms.

8.8 FURTHER READINGS

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BLOCK - III
E-PAYMENT SYSTEMS AND CRM, SCM

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UNIT 9 E-PAYMENT SYSTEMS

Structure

9.0 INTRODUCTION

In the previous unit, you were introduced to the concept of e-security. Security is an issue that is extremely important when it comes to making online payments. An Electronic Payment System (EPS) is an online business process used for fund transfer through an electronic medium, like personal computers, mobile phones, servers and hand-held devices.

Therefore, electronic payment system can be defined as: 'The transfer of electronic money between financial institutions over a secure private network.' Making payments on the Internet is essentially the electronic version of any traditional payment system. However, in the electronic payment system, everything is digital, and it is designed to be handled electronically; no change and/or old currency problems are faced. EPS is a faster payment system which provides its service to customers at low cost.

EPS is not bound by regional boundaries and therefore funds can be transferred anywhere. It is a secure method of fund transfer and provides faster services as compared to a conventional payment system. It provides services not

only to big organizations, banks and business transactions, but also to users and consumers for online shopping and marketing at very low cost. There are various ways by which a customer can make payments, such as by using credit cards, digital cash, debit cards, and so on.

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The issues involved in EPS are:

1. The selection of the mode of EPS by consumers; for example, e-cash, e-cheque, credit cards and debit cards.
2. The management of financial risk associated with various payment instruments—privacy, frauds and error as well as other risks—in the online market.
3. Getting to know the procedures and institutional arrangements that constitute the basics of the process of electronic payment linking consumers and organizations.

In this unit, you will learn all about the concept of e-payments including electronic funds transfer, digital token, modern payment systems, steps for electronic payments and payment security.

9.1 OBJECTIVES

After going through this unit, you will be able to:

- Discuss the concept of electronic funds transfer
- Explain the digital token-based e-payment systems
- Describe the modern payment systems
- Recall the steps for electronic payments
- Discuss the concept of payment security

9.2 ELECTRONIC FUNDS TRANSFER AND ELECTRONIC PAYMENT SYSTEMS

Electronic Payment Systems are becoming central to e-commerce as companies look for ways to serve customers faster and at a lower cost. EPS is being used nowadays in banking, retail, health care, online markets, and even in government transactions. Looking back it can be said that research in electronic payment (e-payment) systems can be traced back to the 1940s. However, it was only in the late 1970s that the first applications and credit cards materialized. In the beginning, this upcoming electronic payment system was known as electronic funds transfer (EFT). It was defined as: ‘Any transfer of funds initiated through a telephone instrument, electronic terminal, or magnetic tape or computer, so as to authorize, order, or instruct a financial institution to credit or debit an account.’

Computer system and satellite communication are employed to transfer, to supply financial assets or money in EFT. Thus, EFT stands in contrast to conventional money and payment modes that rely on physical delivery of cheque or cash.

Types of Electronic Payment Systems (EPS)

There are three main categories of EPS.

1. Banking and Financial Payments
   - Large-scale or whole payment (e.g., bank-to-bank transaction)
   - Small-scale or retail payment (e.g., ATM)
   - Home banking (e.g., bill payment)
2. Retail Payments
   - Credit cards (VISA or Master cards)
   - Private label credit/debit cards (e.g., JC Penny cards)
   - Charges cards (e.g., American Express)
3. Online e-commerce Payments

   This category is again divided into two types:

   (i) Electronic token-based payment system
   - Electronic cash (e.g., DigiCash)
   - Electronic cheques (e.g., NetCheque)
   - Smart cards or debit cards (e.g., Mondex e-currency cards)

   (ii) Credit card-based payment systems
   - Encrypted credit cards (www form-based encryption)
   - Third-party authorization number (e.g., First Virtual)

We will discuss the online e-commerce payment types in this section. Let's begin by discussing the first sub-type.

9.2.1 Digital Token Based E-Payment Systems

Earlier, 'token' as a form of monetary instrument was available. Now, 'electronic token' (e-token) in the form of electronic cash/cheque has been developed. It is recognized as equivalent to cash and is backed by banks.

Types of electronic tokens: There are three types of e-tokens.

(a) Type 1- In this type of electronic business deal, the cash transaction is completed with the exchange of electronic currency. Electronic cash (e-cash) is an example of online currency exchange.

(b) Type 2 –Debit or prepaid: In this type of transaction, users have to pay in advance for any product or services. Smart card and electronic purses are

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examples of prepaid payment system. Delhi Metro has introduced smart card for its travellers.

(c) Type 3–Credit or Postpaid: In this type of transaction, a central server verifies the customer and checks with the bank whether funds are sufficient before any interchanges are made. Credit card/debit card and electronic cheque are examples of postpaid mechanism.

Let's discuss the major categories of electronic token-based payment system.

1. Electronic Cash

Electronic cash (e-cash) is a form of electronic payment system based on encryption. This means it is a secure payment system. Before a product is bought or services availed cash has to be obtained from a currency server. The safety of e-cash is ensured by digital signature.

How to purchase e-cash

The buying of e-cash from an online currency server (or bank) involves two steps:

(a) Establishing an account

(b) Keeping an adequate amount of money in the bank to back the purchases

Currently, in most e-cash trials, all customers must have an account with a central online bank. Transactions must be available to access and pay for foreign services or national services. To maintain this type of access, it has to be backed by many banks. Also, e-cash should be accessible in many currencies in different banks. A service provider of one country must be able to accept tokens of various currencies from the other countries. The following points will make you understand the working of e-cash.

- The user of e-cash can only operates this account with a bank if that bank has the facility to offer e-cash.
- The customer applies for the amount and denomination of e-cash that he/she needs. This amount is debited from the customer's account. To digitally sign the note for the given amount, the bank uses its private key and sends the note back to the customer. In practice, the currency server issues a 'Bank Note' with a serial number and the amount remitted to the customer.
- The bank uses a pair of keys for unlocking and locking funds.
- For encoding a message into a cipher text, a locking key is used. While the key that encodes is kept private, the key that decodes is made public.
- The bank gives to all its customers—both sellers and buyers—its public key. This helps the customers to decode any message or currency encoded with the bank's private key.

- When the user has the e-cash made available to him, he signs the e-cash by using his key (and can also provide it to anyone if he wants)
- The original number is masked or the note is 'blinded' when the e-cash software prepares a note.
- A database of spent notes is maintained by the central bank.

In e-cash, transaction takes place in three steps as follows:

Step - 1: Getting electronic cash

(a) The consumer requests his/her bank to transfer money to the currency server to get e-cash.

(b) The consumer bank transfers money from the consumer's account to the currency server.

(c) The e-mint sends e-cash to the consumer. The consumer receives his/her cash.

Step - 2: Purchasing with electronic cash

(a) The consumers select the goods and transfer the e-cash to the merchant.

(b) The product is made available to the customers by the merchant.

Step - 3: Redeeming cash by the merchant

(a) The merchant may send the e-cash to its bank and the bank in turn redeems the money from the currency server.

(b) The currency server transfers money to the merchant's bank for crediting the merchant's account.

Currency Server

The currency server is a special term used in EPS. The customer and the merchant can exchange the different currencies depending upon the machine used. Currency server can be a type of ATM machine, POS (Point of Sale) terminal and card reader.

Properties of e-cash

The following are the four properties of e-cash:

(a) Monetary value: Although one bank creates e-cash but other banks accept it.

(b) Interoperability: E-cash is negotiable as payment for paper currency, goods and services.

(c) Retrieval and storage: The other quality of e-cash is that it is storable and retrievable.

(d) Security: E-cash is not easy to copy.

Advantages of e-cash

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- E-cash is best suited for small transactions.
- Authentication is not an issue. Who pays is not important as long as the merchant gets his payment.
- E-cash can be issued in very small denominations that can be used to pay for small transactions.
- The low cost of e-transactions makes it feasible for merchants to charge small amounts without losing profit.

2. Electronic Cheques

Electronic cheque (e-cheque) is a form of e-token. E-cheque is planned to accept individuals or a group who prefers to pay on credit or through some method, but not through cash. An electronic cheque has all the same features as a paper cheque. It functions as a message to the sender's bank to transfer funds, the message is given to the receiver, who in turn, endorses the cheque and presents it to the bank to obtain funds.

Working of e-cheques

Step - 1: Purchasing goods

(a) The consumer accesses the merchant server and the merchant server presents its goods to the consumer.

(b) The consumer selects the goods and purchases them by sending an electronic cheque to the merchant.

(c) The merchant may validate the electronic cheque with its bank for payment authorization.

(d) Assuming the cheque is validated, the merchant closes the transaction with the consumer.

Step - 2: Depositing cheques at the merchant's bank

(a) The merchant electronically forwards the cheque to the bank.

(b) The merchant bank forwards the e-cheque to the clearing house for cashing.

(c) The clearing house with the consumer bank, clears the cheque and transfers the money to the merchant's bank, which updates the merchant account.

(d) The consumer's bank updates the consumer with the withdrawal information.

Advantages of Electronic Cheques

(a) It is similar to traditional cheques.

(b) E-cheques are much faster than e-cash, as they use conventional encryption unlike public and private keys used in e-cash.

(c) The risk is taken care of by the accounting server, which will guarantee that the cheque would be honoured.

The following two systems provide electronic cheques for online payment:

(a) Financial Services Technology Corporation (FSTC)

(b) Cyber Cash

NOTES

FSTC system

The Financial Services Technology Corporation (FSTC) is a consortium of banks and clearing houses that has designed the electronic cheque. The model is very similar to the traditional paper cheque. The electronic cheque system uses digital signature for signing and endorsing. FSTC offers users the choice of payment instruments that allow them to designate an electronic cheque as a certified cheque or an electronic charge card slip for greater flexibility.

Electronic cheques can be delivered either by direct transmission over a network, or by e-mail. In both cases, the existing banking channels can clear payments over the network. The whole system is integrated with the existing banking infrastructure and the Internet. FSTC plans for electronic cheques including transfer and transactions involving the National Automated Clearing House Association for transferring funds between banks. Businesses can also use the FSTC scheme to pay for invoices received from other businessmen.

Advantages of FSTC

- FSTC system has a variety of payment options using a single interface that gathers all transactions into a single account log.
- It is not necessary to deal with a number of financial institutions to make these different types of payments. The consumer has to deal only with his bank.

Cyber cash electronic cheque

Cyber cash is an extension of a wallet for credit cards. Unlike the cyber cash credit card system, cyber cash will not serve as an intermediate party for processing cheques. Instead, these functions will be handled directly by banks. The cyber cash electronic cheque system does not provide multiple payment options.

3. Smart Cards

Smart cards, containing microprocessors, are able to hold more information than cards based on the traditional magnetic strips. They help the cardholder to perform operations, especially of financial nature. Most of these methods are known as stored value cards or electronic purse system. Units of prepayment or currency value are electronically stored on an IC (integrated circuit) chip embedded in these cards.

There are two types of smart cards, (a) relationship-based smart credit card and (b) electronic purses.

(a) Relationship-based smart credit card

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As you must be aware, smart credit card is based on some kind of relationship between a cardholder and an organization, such as between Delhi Metro and its commuters or between the users of toll bridges or highways, and the company that has built them. Financial institutions also give enhancement on existing card services or provide new services to their customers through the smart card. Relationship-based smart credit card offers consumers the following options:

- On a smart credit card a customer can access many accounts, such as credit, debit, investments or stored value for e-cash.
- There are multifarious uses of smart credit card, such as payment of bills, access to cash, or funds transfer for selected accounts, etc.
- Smart credit cards provide access to ATMs, a screen phone, a PC, or interactive TVs anywhere and at all times.

(b) Electronic purse and debit cards

E-purse is a wallet-size smart card with programmable microchips that store monetary value in the form of money. The electronic purse works in the following manner:

After the purse is loaded with money at an ATM or through the use of an inexpensive special telephone, it can be used to pay for candy, for instance, in a vending machine equipped with a card reader. The vending machine is authentic and there is enough money available for a chocolate bar. The value of the purchase is deducted from the balance on the card and added to an e-cash box in the vending machine or ATM machine. When the balance in the electronic purse is empty, then the purse can be recharged with more money.

9.2.2 Credit Card-based Payment Systems

So far, we have seen the problems associated with e-cash and electronic cheques. The credit card payment system on the Internet provides one possible time-tested alternative. When a customer buys a product or avails a service, the details of the credit card is given to the seller of goods or to the service providers involved. The credit card provider makes the payment.

The credit card transaction simply requires that the consumer has a legitimate credit card number and expiration date while placing an order. This information has been provided through standard Internet options like e-mail/SMS. Credit cards use personal information number (PIN). The pin is a secret code that the

consumer must enter while using the credit card online. As such, it prevents the misuse of the card in case it is stolen. We can divide the credit card system into three basic categories:

(a) Payment made by simply furnishing the details of the credit card
(b) Payment made by providing the encrypted details of the credit card
(c) Payment made on the basis of verification by a third party

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(a) Payment using plain credit card details

In plain credit card payments, unencrypted information is exchanged through the Internet or telephone lines. However, this system provides a low-level security as any snooper can read a credit card number, and programs can be created to scan the Internet traffic for credit card numbers and send the numbers. Authentication is also a serious issue with the plain credit card system. Since in this system, it is the responsibility of the seller or service provider to make sure that the person using the credit card is its legitimate owner. Without the help of encryption, it cannot provide authentication, and, therefore, this system is not in use.

(b) Payment using encrypted credit card details

In this type of credit card system, the credit card data is encrypted and fed into a browser or any other e-commerce devices and safely sent through the network from the buyers to the sellers. This provides safety, privacy and security as encrypted information is transferred over the public network.

(c) Payment using third party verification

This credit card system uses a third party for security. An organization that gathers and allows payments from one client to another is known as third party. After a lapse of sometime, the transaction of one credit card for the whole accrued amount is completed.

Working of encrypted credit card system

- A consumer presents his credit card information along with his authentication signature (or PIN number) to a merchant server.
- The customer's identity as the proprietor of the credit card account is authenticated by the merchant server.
- Then the information about the credit card charge and signature to its bank or online credit card processors is represented by the merchant server.
- The information to the customer's bank for authorization approval is further represented by the bank or processing party.
- Finally, the credit card data, charge authentication, and authorization to the merchant is returned by the customer's bank.

NOTES

Check Your Progress

1. What are the two steps involved in buying e-cash from an online currency server?
2. Mention examples of currency server types.

9.3 MODERN PAYMENT SYSTEMS

In this section, you will learn the different elements of the modern payment systems.

9.3.1 Cards: Debit and Credit

Cards are of two types, debit cards and credit cards. Both the cards serve the same purposes, withdrawal of cash at ATMs and utilization for different purposes, such as purchase of goods and services. However, debit cards can be availed of only to the extent of the available balance in the account, while credit cards facilitate up to the agreed credit limit.

(a) **Debit cards:** A debit card is a laminated plastic card issued by a bank, which allows the cardholders to use up to the available balance. However, the transaction limit varies from bank to bank. Some banks provide international ATM-cum-debit card, which can be used within and outside India at a nominal fee. These cards enable customers to shop at a large number of merchant establishments in India and to carry a minimal amount of cash, wherever they go, since they can withdraw cash at most ATMs, which are available in every nook and corner. The use of debit cards is increasing in popularity due to its ease and convenience, as well as innovative approaches by banks.

(b) **Automated teller machines (ATMs):** ATMs have become access points for most banking transactions—customers prefer to visit a conveniently located ATM rather than visiting their bank. Customers can access their bank accounts through any bank's ATM, without any extra charges. ATMs facilitate the following services:

- Cash withdrawal
- Account information, such as balance, display and print of last few transactions
- Utility payments, such as electricity, phone bills and even donations.
- Reloading for mobiles
- Mini/short statement
- Cash and cheque deposits

Banks also have bilateral sharing arrangements with other banks to enable their customers to secure access to their accounts through the ATM of any bank. Customers no longer look out for their bank ATM—they can do business at any bank's ATM. Bilateral sharing arrangements such as these mean that the bank extending ATM services to customers of other banks earns a commission from those banks.

Although ATMs are convenient and have made life simpler for bank customers, they are also prone to frauds. Senior citizens are often easy victims, as they are cash rich and not familiar with the latest banking technology, yet they cannot afford to forego the convenience of using an ATM. Customers need to remember that electronic devices can be used fraudulently. They need to take some precautions to make the ATM experience safe (Box 9.1).

Box 9.1 Precautions to be Taken while using ATMs

- Memorize your personal identification number (PIN) and do not share with anyone.
- Stand close to the ATM and cover the keypad with your hand, while entering the PIN.
- Do not take help from strangers to use the card or handle cash.
- Always press the 'Cancel' key before leaving the ATM, to prevent the abuse of your card.
- Always pay attention to suspicious objects, which are mounted or close to the ATM.
- Change the PIN after receiving it. In fact, change the PIN at regular intervals and remember the current PIN.
- Do not write PIN numbers on the cover of the debit cum ATM card. People often do this to remember. If the debit card is lost, anyone who finds the card can steal from the account.
- Remember to collect the card from the ATM machine before making an exit.
- Avail of free SMS facility in SB account–it can be a useful alert when fraudulent withdrawals occur through ATMs.
- Immediately report a lost or stolen card to the bank or helpline.

Banks are increasingly outsourcing ATM deployment and management to third party vendors, helping them to focus on their core business initiatives and enabling speedy service and efficiency.

ATMs have become revenue centres for banks as they get commission from other banks, if their outlets are used by customers of other banks. Now, banks are on the look out to open ATMs in convenient locations for their customers. ATMs have become profit centres to reduce costs and add profitability.

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(c) **Credit card:** This is also a laminated plastic card, similar to a bank card, issued by a bank or non-banking financial company (NBFC), giving the credit card holder the facility to buy goods and services from merchants, traders and other parties based on the credit sanctioned to them. As you have learnt in the previous section, a credit card is to be used within a prescribed credit limit. This limit is based on the earning capacity and credit worthiness of a credit card holder as communicated by the entity issuing the card to its customer. By using a credit card, customers promise to pay for the credit card transactions executed by them. Generally, credit card holders are given a credit period of 30–45 days for all purchases made by them. If full repayments are not made within the stipulated period, interest is collected at the agreed date.

The greatest attraction of a credit card is the free credit period. However, if the card holder does not pay within the free period, the firm issuing the credit card charges interest from the date of purchase. In other words, there is no free credit period, if full payment is not made within the free period. If a small payment is made, the balance is allowed to be carried forward to the next month. But the interest is abnormal and many are not aware of this aspect.

Credit cards are a revenue-generating item for banks as they often earn interest, while debit cards are service-providing items, as only the available balance can be withdrawn. It is for this reason only that banks market credit cards aggressively. More debit cards are in circulation, but credit cards are better placed in terms of business.

Credit cards have become another major revenue-earning stream for banks as they charge a higher interest rate on the short-term credit provided through this mechanism. With the liberalization, growth of economy and spread of consumer culture, customers started using credit cards for all types of payments for which cash was used earlier. Customers pay the minimum required balance per month and transfer the balance to the next month; this gives immense opportunities for banks to boost their revenue, while providing greater flexibility and convenience to credit card holders.

Owning a credit card is considered a status symbol by many. To woo customers to avail of credit cards, expensive product providers and banks have associated to offer bonus points or even return commission to encourage people to buy their products.

9.3.2 E-banking or Net Banking

E-banking enables customers to conduct their financial transactions through the bank's secure website. E-banking is the outcome of technological innovations and competition, which has become part of present-day banking culture. The thrust of modern banking is on integrating technology and electronic and telecommunication networks to deliver a wide range of value-added products and services.

E-banking is born out of a desire to perform a chore easily and conveniently, while optimizing the use of time. E-banking is ideal for those who are hard-pressed for time, an integral part of present living, in metros and cities. Online banking enables customers to transact bank business at their convenience, using computers and the internet. *Online banking done through a computer, with internet facilities, is also known as e-banking or net banking or internet banking.*

Banks give customers user-IDs and passwords, to operate an account, after they successfully register with the bank. They can check their account balance, view the last few transactions related to their account, get summary statements, stop cheque payments, and pay off utility dues. They can also request cheque books, drafts and bankers cheques; transfer funds to their own accounts with other branches or banks; request third-party transfers; invest and renew deposits; issue standing instructions and register their mobile numbers for SMS alerts. Customers can monitor and control their funds through internet banking.

Banks extend both a viewing facility and a transaction facility, depending on individual customers' preferences and requirements. Some choose a viewing facility only, to avoid abuse by unauthorized persons, which is a wise precaution. If a facility carries risks, it is prudent to weigh both the risks and benefits and take the appropriate decision. If customers know they will not use a transaction facility, it is wisest not to apply for it; otherwise they expose themselves to the risk of unauthorised intrusion. When choosing a transaction facility for the account, only keep the required balance there to mitigate risks connected with e-banking and replenish funds from time to time. Banks implementing an e-banking platform face risks that differ from those they encountered in their bricks-and-mortar business. These risks grow in magnitude when business is conducted online.

Of late, many people have had their account details compromised as a result of online banking. If one is going to use e-banking for financial transactions, he should be aware of the risks involved. Awareness of the risks and problems enables him to take precautions for a more secure online banking experience.

9.3.3 Mobile Banking

This is another platform for banking transactions through mobile applications. People who are hard pressed for time find mobile banking an easy and convenient way to conduct their banking business, even on the move. Mobile banking implies the use of a mobile phone and suitable apps to conduct banking transactions. The introduction of this new platform suits the busy people of today.

Mobile banking users can avail the following services:

- Reading mini statements
- Checking account history
- Monitoring term deposits

- Accessing loan statements
- Accessing card statements
- Accessing mutual fund statements

NOTES

- Depositing insurance policy payments
- Managing pension plans
- Checking the status of cheques
- Stopping payment on cheque
- Ordering cheque books
- Checking the balance in the account
- Checking the recent transactions in account
- Changing the PIN through online and reminder
- Blocking lost cards

9.3.4 E-Transfer

Earlier, money could be transferred either through drafts, telegraphically or by phone. E-transfer is an online, paperless money transfer service, which enables customers to send money directly from one bank account to an account in another bank.

National Electronic Funds Transfer (NEFT) is a nation-wide payment system that facilitates one-to-one funds transfer. Under this scheme, individuals, firms and corporates can electronically transfer funds from any bank branch to any individual, firm or corporate having an account with any other bank branch in the country participating in the scheme.

NEFT offers many advantages over the other modes of funds transfer:

- The remitter need not send the physical cheque or demand draft to the beneficiary.
- The beneficiary need not visit a bank to deposit paper instruments.
- The beneficiary need not be apprehensive of loss/theft of physical instruments or the likelihood of fraudulent encashment thereof.
- The system is cost effective.
- Credit confirmation of the remittance is sent by SMS or email.
- The remitter can initiate the remittance from the residence/place of work using internet banking.
- This system provides near real time transfer of the funds to the beneficiary account in a secure manner.

Real time gross settlement systems (RTGS) facilitate transfer of money from the account of one bank to another with a different bank on a real time and on gross basis. Settlement in real time means that the payment transaction is not subjected to any waiting period. The transactions are settled as soon as they are processed. Gross settlement means that the transaction is settled on a one-to-one basis without bunching or netting with any other transactions. Once processed, payments are final and irrevocable. The RTGS system is primarily meant for large-value transactions. The minimum amount to be remitted through RTGS is ₹2 lakh. There is no upper ceiling for RTGS transactions.

NEFT and RTGS have become recent modes of transferring funds, which are fast and inexpensive. RTGS is a faster mode of transfer of funds compared to NEFT.

9.3.5 Core Banking

With core banking, both deposit and withdrawal can be made at any branch. When a deposit is made at any branch, the deposits are reflected immediately on the bank's servers and the customer can withdraw the deposited money from any of the bank's branches. These applications have the capability to address the needs of corporate customers, providing a comprehensive banking solution. Nowadays, most banks use core banking applications to support their operations. CORE stands for 'Centralized Online Real-time Exchange'. On account of core banking, banks can access applications from any branch through its centralized data centres.

With the introduction of core banking, banking is no longer branch banking, but has become core banking as customers can operate their accounts through any branch of that bank. The day may not be far when customers of one bank can operate with any branch of any bank.

- **Cheque truncation system:** Cheques drawn on other banks are collected through clearing. For this purpose, these instruments move physically from the banks where they are deposited to those banks where they are drawn. With the onset of modern banking, the instruments are not likely to move physically, but only their images would be transmitted to the banks where the instruments are to be paid. This exercise is called cheque truncation system, which would revolutionize the speed of collection and elimination of staff travel to the clearing house too.

The media has highlighted how banking in the future, will use technology to transform the pace and face of banking in clearing operations and the procedure for clearing of non-CTS cheques has also been highlighted for the convenience of the public.

9.3.6 Other Online Payment Systems

In this section, you will learn about some of the newer systems of online payment systems.

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E-wallet

E-Wallet can be said to be a prepaid account which allows the customer to save the multiple credit cards, and bank account numbers in the secure environment. Here the chance of giving key information of the account every time during payments is reduced. In case the customers have registered and created a E-Wallet profile, then he can make payments faster from the wallet. There are payment e-wallet systems today including BHIM, Paytm, Mobikwik, Airtel Money, Citruspay among others.

Smart Card

As you have learnt before, smart card is a plastic card which is embedded with a microprocessor which has the customer's personal information. The same has the information stored in the microprocessor. This could be loaded with funds for online transactions. The same could also be used for instant payment of bills. This money which is loaded in the smart card will reduce the usage by the customer and will have to be reloaded from the user's bank account.

Unified Payment Interface

It is a platform based on the Immediate Payment Service (IMPS), wherein the money is transferred from one bank account to another immediately. Unlike in an e-wallet, there is no need for loading cash into the wallet from a bank account before transferring it to another wallet.

9.3.7 Steps for Electronic Payment

The main steps involved in any electronic payment system will change on the basis of the workings of that particular payment system.

The main steps for a general electronic payment system has been listed below:

- **Step 1:** In step 1 of the electronic payment, the buyer has to submit a payment request with the help of his cell phone, or mobile payment processor (one example of this is **SWIPE**).
- **Step 2:** The second step would be that the service provider will route the data with the help of a secure connection to the buyer's bank or credit card company.
- **Step 3:** The next step would be that the buyer's bank will now approve the transaction. This will be based on the buyer's funds in the bank. In case the same is approved by the bank then the transaction could be routed back to the payment provider and then be processed.

- **Step 4:** The next step would be that the payment provider will store the transaction information and then a record will be sent to both the seller and buyer.
- **Step 5:** The last step would be that the goods or services could be sent to the buyer. After this the buyer's bank will send the funds to the seller.

This whole process will just take a few seconds.

Check Your Progress

3. How have ATMs become revenue centres for banks?
4. What are the two broad services provided by banks for e-banking?
5. State the meaning of gross settlement in RTGS.

9.4 PAYMENT SECURITY

A secured payment transaction system is of critical importance to e-commerce. Without standard security, you cannot assume the success of e-commerce, hence, there are two common standards used for a secure electronic payment system:

1. Secure Socket Layer (SSL)
2. Secure Electronic Transaction (SET)

1. Secure Socket Layer (SSL)

Secure socket layer (SSL), is a protocol that enables data security layers between high-level application protocols and TCP/IP. It provides:

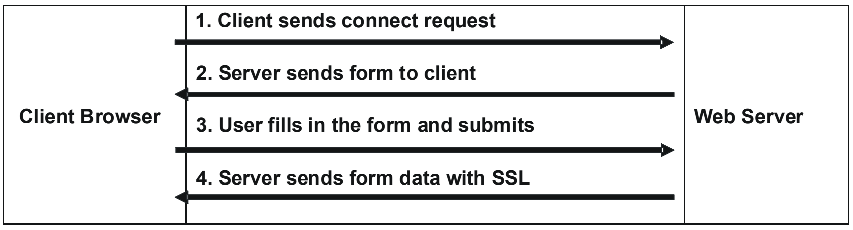
- Data encryption
- Server authentication
- Message integrity
- Optional client authentication

SSL is layered between application protocols such as HTTP, SMTP, TELNET, FTP and GOPHER, above the Internet connection protocol, TCP/IP.

E-Commerce Application
Server HTTP
TCP-based application protocol as HTTP, SMTP, NNTP
SSL
Internet Protocol (IP)

NOTES

SSL gives a security 'Handshake' protocol to start the TCP/IP connection. The consequence of this handshake is that the client and the server agree on the level of security they would use and completes any verification necessities required for the connection. After that, it is only used to decrypt and encrypt the message stream.



SSL makes available encryption that begins a secure channel to thwart third parties on the network from being able to interfere with and read messages that are communicated between the client and the server. It also helps confirmation that uses a digital signature to verify the authenticity of the server. To offer security, the Netscape Navigator supports a new URL access method, https, for linking to HTTP servers using SSL (that means http is a protocol that is simply SSL underneath HTTP).

We should use 'https://' for HTTP URLs with SSL, whereas you continue to use 'http;//' for HTTP URLs without SSL, as (HTTP + SSL)= https, and HTTP are different protocols and typically reside on different ports (443 and 80, respectively). However, the similar server system can run both—the server and the insecure HTTP server simultaneously. This shows that HTTP can offer some information to all users using no security and https can provide only secure information. As for instance, merchant catalogue can be insecure but the ordering payment forms could be secure.

The advantage of SSL over secure HTTP is that SSL is not limited to HTTP, but can also be used for making secure FTP and TELNET among other Internet services. Moreover, as SSL encrypts everything, the display of complex pages can be slow, and, therefore, those sites that are protected often use minimal graphics to minimize the performance impact.

2. Secure Electronic Transaction

SET was briefly mentioned in the previous unit under XML security. MasterCard and Visa developed the secure electronic transaction (SET) standard for the safe use of debit, credit, and corporate purchasing cards over the Internet. Microsoft, GEE, IBM, RSA and VeriSign are the co-developers. The SET protocol is a set of written standards that explain how banks, merchants, consumers and Cybercash associations should execute the transactions of these cards across the Internet and WWW. SET architecture includes a number of entities such as:

- Cardholder
- Merchant

- Acquirer
- Issuer and payment gateway
- Number of certificate authority

SET protocol provides the following services:

(i) Protection of the cardholder's account details from both fraudulent merchants and eavesdroppers

(ii) Non-repudiation for both the merchant and the cardholder on the agreement of transaction

(iii) Assurance to the merchant that the payment will be sure

Suppose a consumer has a browser, such as Microsoft's Internet Explorer that is SET-enabled; and on the other hand, banks, merchants, etc. have a SET-enabled server. The following are the steps involved in the transaction:

1. The consumer would open his MasterCard or Visa bank account on his SET-enabled browser.
2. The consumer has a digital certificate and private signing key. This certificate is used for signing the credit card for online purchases or other transactions.
3. The bank should have certificates from the third-party merchants. These certificates comprise the public key of the merchant and the public key of the bank.
4. Over a web page, the customer places an order.
5. The merchant's certificate is received by the browser of the customer and the latter confirms it from the certificate of the merchant, the validity/invalidity of the merchant.
6. The order information is sent by the browser after encryption with the merchant's public key, and the payment information is encrypted with the bank's public key.
7. The merchant validates the customer by examining the customer's certificate on the digital signature. This is done by referring the certificate to the bank or third party.
8. With the bank's public key, the merchant gives the order message to the bank as well as the merchant's certificate, and the customer's information.
9. The bank authenticates the merchant and the message with the help of the digital signature on the certificate along with the message and verifies the payment part of the message.
10. The bank digitally signs and sends authorization to the merchant, who can then fill the order.

NOTES

Check Your Progress

6. Where is the SSL layered?
7. Who developed the secure electronic transaction (SET) standard?

9.5 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. The buying of e-cash from an online currency server involves two steps:
    - Establishing an account
    - Keeping an adequate amount of money in the bank to back the purchases
2. Currency server can be a type of ATM machine, POS (Point of Sale) terminal and card reader.
3. ATMs have become revenue centres for banks as they get commission from other banks, if their outlets are used by customers of other banks.
4. Banks extend both a viewing facility and a transaction facility, depending on individual customer's preferences and requirements for e-banking.
5. Gross settlement in RTGS means that the transaction is settled on a one-to-one basis without bunching or netting with any other transactions.
6. SSL is layered between application protocols such as HTTP, SMTP, TELNET, FTP and GOPHER, above the Internet connection protocol TCP/IP.
7. MasterCard and Visa developed the secure electronic transaction (SET) standard for the safe use of debit, credit, and corporate purchasing cards over the Internet.

9.6 SUMMARY

- An electronic payment system is an online business process that enables fund transfer through an electronic medium such as personal computers and mobile phones.
- Nowadays, EPS is being used in banking, retail, health care, online markets and in government transactions.

NOTES

- The three main categories of EPS are banking and financial payments, retail payments and online business payments.
- Online e-commerce payments are divided into two major types: electronic token-based payment system and credit-card based payment systems.
- The tokens of yester years have been replaced by electronic tokens such as e-cash and e-cheque. E-tokens are of three types—cash or real-time, debit or prepaid and credit or post-paid.
- Credit card system are categorized as: payment made by simply furnishing the details of the credit card, payment made by providing the encrypted details of the credit cards and payment made on the basis of verification by a third party.
- Cards are of two types, debit cards and credit cards. Both the cards serve the same purposes, withdrawal of cash at ATMs and utilization for different purposes. However, debit cards can be availed of only to the extent of the available balance in the account, while credit cards facilitate up to the agreed credit limit.
- E-banking of net banking enables customers to conduct their financial transactions through the bank's secure website. Online banking enables customers to transact bank business at their convenience, using computers and the internet.
- Mobile banking implies the use of a mobile phone and suitable apps to conduct banking transactions.
- E-transfer is an online, paperless money transfer service, which enables customers to send money directly form one bank account to an account in another bank.
- CORE stands for 'Centralized Online Real-time Exchange'. With core baking, both deposit and withdrawal can be made at any branch.
- Other newer and modern payment systems include e-wallets, smart cards and UPI.
- A secured payment transaction system is of critical importance to e-commerce. Without standard security, you cannot assume the success of e-commerce, hence, there are two common standards used for a secure electronic payment system: (i) Secure Socket Layer (SSL) and (ii) Secure Electronic Transaction (SET).

9.7 KEY WORDS

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- **Electronic funds transfer:** It refers to any transfer of funds initiated through a telephone instrument, electronic terminal, or magnetic tape or computer, so as to authorize, order, or instruct a financial institution to credit or debit an account
- **Electronic payment system:** An online business process used for fund transfer through an electronic medium
- **Electronic cash:** A form of electronic payment system based on encryption
- **Secure socket layer:** It is a protocol that enables data security layers between high-level application protocols and TCP/IP
- **Secure electronic transaction (SET) protocol:** It is a set of written standards that explain how banks, merchants, consumers and Cybercash associations should execute the transactions of these cards across the Internet and WWW

9.8 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short-Answer Questions

1. What are the major categories of electronic payment system (EPS)?
2. What are the three categories of credit card system?
3. Write a short note on the modern major card systems available.
4. Briefly explain the concept of e-transfer.

Long-Answer Questions

1. Describe the digital token-based e-payment systems.
2. Explain the different modern payment systems available today.
3. Discuss, in detail, the concept of net banking and mobile banking.
4. Examine the common standards used for a secure electronic payment system.

9.9 FURTHER READINGS

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UNIT 10 E-CUSTOMER RELATIONSHIP MANAGEMENT

Structure

10.0 INTRODUCTION

Up till now you have learnt about different aspects of e-commerce. This included concepts like the e-commerce activities, e-commerce communication process, the internet and related infrastructure necessary for e-commerce, concepts of data warehousing, e-marketing, e-security and e-payments. In this unit, we turn towards a different topic of e-commerce. This pertains to the customer relationship management, specifically pertaining to e-customers.

In this unit, you will learn about the concepts related to e-customer relationship management.

10.1 OBJECTIVES

After going through this unit, you will be able to:

- Discuss the concept of customer relationship management and its areas
- Explain the CRM processes
- Describe the architectural components of an e-CRM solution
- Explain the architecture and applications of electronic CRM

10.2 CUSTOMER RELATIONSHIP MANAGEMENT: CONCEPT

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It is important to understand the meaning of customer relationship. Thus, some definition are critical for the same:

Gartner defines CRM as 'A business strategy designed to optimize profitability, revenue and customer satisfaction.'

PWC defines CRM as 'A business strategy that aims to understand/ appreciate, manage and personalize the needs of the organization's current and potential customers.'

Jill Dyche defines CRM as 'The infrastructure that enables the delineation and increase in customer value and the correct means by which to motivate valuable customers to remain loyal and buy again.'

Paul Greeberg defines CRM as a 'philosophy and a business strategy, supported by a system and a technology, designed to improve human interactions in a business environment.'

CRM (customer relationship management) is a set of information used for methodologies, software, and Internet capabilities which help the organization manage well their customers and his needs.

For example, maintaining a database of customers and their unfulfilled needs, passing this information to the production and sales department so that they can chalk out products which fulfils this desired need of the customer. All this will form a part of CRM.

Concept of CRM and e-Customer

CRM means three golden words namely Customer Relationship Management. CRM is an effort of putting the customer at the centre of any business's integral processes. CRM is one way of passing all the information of a company for, by and to the customer.

Many companies are trying to implement CRM just as a part of an added IT package to their company. It is but very important to analyse the following parameters before installing the right CRM package in the firm's IT system.

What is the purpose of CRM in the company?

The organization has to first be sure that it knows exactly what it wants out of the CRM. It should not just be installed as a "Me too" Strategy (Greenberg – 2004). The true goal and relevance of the goal should be known by the company before implementing the CRM system.

Does it fit my type of customer?

Remember all this hassle is for the customer who is at the pinnacle of every business process today. One needs to be sure that the CRM is helping the company achieve

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the goals of customer satisfaction in the present scenario. One has to judge who the customer is and how and to what level CRM helps in satisfying him. It should be worth all the money spent to maintain the customer loyalty and satisfaction for the product.

Some Notions Related to the Concept of CRM

- **CRM is a part of only the marketing department**

It is wrongly perceived by many in the corporate that CRM is the baby of the Marketing department(Paul Greenberg - 2004). Thus, CRM is limited to the marketing department only. It is expected to be nurtured, grown, modified and implemented in this restricted area of marketing. This however is a misunderstanding as far as the CRM is concerned. CRM is a way of combing all the information of the organization and giving it the right path to lead to an increased customer satisfaction. Thus, it has to involve all departments of an organization.

It might be true that the initial input, that of customer perception and data will be collected generally by the marketing department. This is so because they are directly in interface with the consumers in the market. However, this fact does not limit the uses of CRM to only the marketing department. For example, the top management uses CRM systems very often to take decisions and forecast sales of the company for the future.

- **CRM is too technical to learn**

Since time immemorial CRM is perceived as an IT subject and IT software. It is thus believed that CRM is too technical for the common employees to understand and use. This is however a myth (Frederick Newell, Seth Godin – 2003). CRM is present in an organization to make work easy, not to stand up as a technical challenge itself.

It is but the right education and training about the CRM to the employees which can make a difference. If the employees of a company can be convinced upon the point that learning the CRM will only help each one of them to move a step forward towards the customer, things will become much easier.

- **CRM can be effectively used by any company**

There is a general notion that CRM is a system which can be effectively used by any company. This statement is partly true. It is seen that CRM can be implemented in any company. Any company that has the funds to support the CRM system can purchase it.

Also, basic education and training about the product and its advantages can also help employees use the CRM. It can be installed in the production, marketing, finance and top level management departments(Frederick Newell, Seth Godin – 2003). It can also be used to save information about customers, their taste, their repeat purchase, loyalty etc. But this is not all what CRM is all about.

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The effective utilization of the system will only bear fruits if used properly. It is these departments like marketing, finance, production, etc., which have to be looped under a synchronized information flow. For example, the marketing department can collect information about the flavours of juices most preferred by the customers, but it is the production department which will let the organization know about the feasibility of the production of that flavour of juices. It is the finance department which will inform about the budget of the change in flavours. Thus, an integration of all these departments for effective use of this customer information collected will lead to and effective decision making and strategy formulation.

10.2.1 E-Customer Relationship Management

E-CRM is the use of Web or Internet based applications like e-mails, chatrooms, social media, forums, etc., to achieve the objectives of CRM for an organization. Its primary purpose is to automate the process of marketing and customer relationship through enhancing or rather customizing the products and services to meet the customer's individual needs. There are several benefits of E-CRM; it helps companies increase the efficiency of their processes, help the customer's meet their needs from those products and services, increase customer loyalty and relationship, cost reduction and increase in revenue of the businesses.

E-CRM helps form an efficient relationship between three entities the company, customers and employees through Web based technologies. E-CRM should not be confused with being a software. Rather, it is the use of Internet based technologies to understand customer satisfaction in a better manner.

The history of CRM goes back to the retailers who wanted feedback on the likes/dislikes of the consumers about merchandise. This brought in personal relationship. The Internet and online sales now have created new challenges to enhance customer relationships. The E-CRM have brought in a major change in the conventional business model. Some companies are still unclear about the web contents, web design which could give good E-CRM strategies.

In today's e-business world, customers search product information on companies' websites. The exclusive provider of information or pricing is extinct in this new e-economy. The product information is no longer under the control of a channel member but can get published by independent sources which could be easily accessible and available to the consumers.

The E-CRM strategy of every company will vary according to their respective customers. Thus, it is very important to understand and chose the right strategy to implement E-CRM successfully in the organization.

Benchmarking for success rate

It is critical to set a benchmark or a standard against which the accomplishment of the goals is to be measured. These benchmarks should however be attainable and high enough to provide a marginal success as far as the customer is concerned.

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Rectifying errors:

After the measurement with the stated benchmarks, the organization has to analyse if it has reached the optimal level of customer satisfaction through the E-CRM or not. And if not, now the rectifications need to be done for the proper functioning of the E-CRM.

Benefits of Enterprise CRM

E-CRM is a customer driven system. The purpose of E-CRM is the better servicing and satisfaction of the customer for repeat business and thus profitability of the company. E-CRM helps business organizations in the following major ways:

- E-CRM helps in accumulating data about every aspect of the customer. Starting from who is the customer to what he wants to where he wants the product, all can be saved in an E-CRM system for efficient use later on.
- Information stored in the E-CRM is a true reflection and reminder to the company about customer problems. It will list not only the satisfaction from the present offering but also about what could be improved in the offering. Thus, it is a reflection of what the customer wants out of your company.
- There are many ways to form customer information database. All these are efficiently managed by the E-CRM system. For example, the information pool of the customer name, address, date of transactions, pending transactions, issues and complaints, status of order, shipping and fulfillment dates, account information, demographic data, repeat customer etc.
- It makes it easy for the company to reach the prospective customer with the help of an E-CRM vis a vis the traditional methods of targeting customers. For example, in courier companies at the click of a mouse, your consignment can be tracked without the hassle of searching for it traditionally. This leads to a better management system and easier way of working both for the company and the customer.
- Time efficiency of delivering products increases. Maintaining a database of routine customers is helpful in many ways. First of all, the company can pamper the present loyal customers with new offers. Secondly, the new products of the company can directly be introduced to these customers. They will also help in forming a positive word of mouth for the company as they are already associated to it for long. All this can be possible with E-CRM.
- Importance to the top management: E-CRM is important to the top management as they are the reflection of the customer's mind and soul. Thus E-CRM can help the top management in taking worthy decisions about the product on the basis of the customer information present in the customer feedback database.

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- One department which benefits the most from E-CRM is the marketing department. E-CRM information and reports are very useful to the Marketing, Advertising and Sales strategy makers of the company. E-CRM helps selling these strategies to target customer needs.
- E-CRM is a brilliant way to integrate all the departments of an organization. It is known that no department can work in isolation. Thus, a system like E-CRM will not only introduce the target customer to all departments of the organization but also it will help them to work together to satisfy this King, the customer. For this practice however it is necessary that all the departments get the right information at the right time for the best usage.
- E-CRM system will help the organization in expanding your business. E-CRM systems are capable of handling enormous amounts of data, E-CRM systems will help the organization to cope up with the increased numbers of customers and data.
- With an E-CRM system installed and properly utilized, the organization can be sure that all the information is flowing in the organization in the right way with the ultimate objective to serve better the target customer.

10.2.2 Marketing Automation

Sales force automation (SFA) is a software used to streamline all phases of the sales process. Thus, through the process, it minimizes the time which a sales representative has to spend on each phase. Now the company will have to keep fewer sales representatives for their clients.

There is a contact management system in the SFA which records and tracks every stage in the sales process. This could be finding a prospective client, and the process from the initial contact to final sales. Some SFA applications could also give insights into opportunities, sales forecasts territories, and workflow automation. (Mark Humphries, Michael W. Hawkins, Michelle C. Dy (1999).

CRM has more in common in sales force automation since it establishes connection with the customers in relation to the sale of the products and services. CRM is sales focused, in the sense that it integrates data related to not only current but potential customers.

Marketing automation, on the other hand, as the name suggests deals with the concept of automation brought in for marketing activities. Its primary job is to streamline and automate marketing related software and processes. One of the typical activities of marketing automation is collecting information and tracking marketing campaigns in the form of e-mail or social media or any other marketing related promotions and processes the company is following. Marketing automation has several benefits including providing analytics related to segmenting customers based on certain traits for targeted marketing promotions, providing lead-nurturing facilities as well as providing an overall analysis of the performance of the campaign once it ends.

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10.2.3 Enterprise Customer Relationship Management

Customer Relationship Management provides simplistic solution to companies to management the satisfaction of customers through customization of their products and services. But it is crucial to note that while such CRM solutions thrive in smaller organizations with rather simplistic sales and marketing teams, they struggle when the product lines are many and sales territory rather large. For such complex or large scale business, CRM solutions often come with a specialty in 'Enterprise CRM'.

Enterprise customer relationship management is suitable for companies which have multiple teams servicing old, new and potential clients in different capacities in different sub-units of the company. It allows an automated and streamlined process in which all customer-dealing service personnel are equipped with information and processes that is being implemented across the enterprise. It coordinates cross-functional activities, promotes coordination, and provides real-time important information to the stakeholders for better services.

Check Your Progress

1. Why is said that CRM is only relevant to the marketing department?
2. What are the three entities which form an efficient relationship through E-CRM?
3. Mention some examples of information collected for customer information database.
4. List some of the benefits of marketing automation.

10.3 E-CUSTOMER RELATIONSHIP MANAGEMENT AREAS

There are many customer relationship management areas which have to be managed by the company. Some of them have been given below:

Permission marketing is the term of marketing when the marketers obtain permission before advancing to the next step in the purchasing process. They could ask for permission to send email newsletters to prospective customers. The same is applicable to a large extent to the online marketers and direct marketers who send a catalogue for sales.

Thus, the prospective customer has to give explicit permission for the marketer to send their promotional message. The same could be done by an online email or by using search engines of a commercial nature.

Personalization marketing

The concept of website 'personalization' has become an integral component of many customer relationship management (CRM) systems. The 'personalization'

dimension of CRM talks of tailoring the website for each *individualized* shopper needs and preferences. This encourages one-to-one communication.

The same is but dependent on variables like budget, human resources, and technological acumen. Many companies use 'Cookies' which are designed to track the proclivities, actions, and habits of Internet users for creating a profile for discrete website visitors. This is called profiling.

There are but some privacy issues apart from which one can have a very 'personalized' shopping experience. Also, the web pages are generated by the search terms which the user enters in the subject search query. If the search data is returned, the web page could be 'customized' based on a given search term. This 'Customization' has no major active participation in defining parameters or personalization variables.

For personalization, the Communication and website architecture are both crucial. *Humanizing* the site could be preferable to personalizing it.

Creating Customer Base

Creating customer base is a very important but a Herculean task for E-marketers. The same can be done in the following ways:

- Contact information: The most important point for an E-marketer would be getting the contact information of the customers specially the e-mail account information.
- Client status would focus on how this customer compares with your other customers
- Lead source is where your customer first heard about you
- Demographics includes important factors like age, sex, income, etc.
- Personal information could be children's names, hobbies, etc.
- Personal and relationship information: This would include the notes on personal contact with the customer
- Purchase history: This would pertain to what the customer had bought and when

Most organizations have similar expectations from a CRM solution. There are certain factors that companies should consider when selecting a CRM so that it suits the business practices and customer target. These factors should gel with the organization's people, processes, and technology that will play a role in the effective working of your CRM solution.

The finances of the company are an important consideration for deciding the type of software for CRM. The size of your business, present number of users, the goal of the organization and future strategies will decide the cost of the software and the total cost of ownership. Vendors are compared for the one-time cost of software and the TCO over a period of time. The installation and maintenance costs can be limited with a good infrastructure.

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10.3.1 CRM Processes

The following tools are used in e-CRM:

- Creation of personalized web pages that recognize and reflect customers' preferences
- Customized products or services

In other words, a business environment has almost all companies connected via the Internet. E-CRM is more than just a tool that offers a competitive advantage; it is mandatory for a company's survival.

E-CRM solutions have multifold benefits—decreased costs, increased revenues and improved customer service are only a few. E-CRM objectives can be attained with the help of Web-based CRM specification development, Internet business strategies, Web system designs, e-publishing and projects management interactive interface design.

The strategy for e-CRM can be visualized in the following three steps:

Step-1: Customer Information Environment

First step is collecting information about the customer and creating a customer information environment. It also consists of metrics programs that monitor customer behaviour.

Step-2: Customer Value Orientation

This step focusses on operational effectiveness. Customers want value for their money. They believe in a perceived value, and this is represented in Figure 10.1.

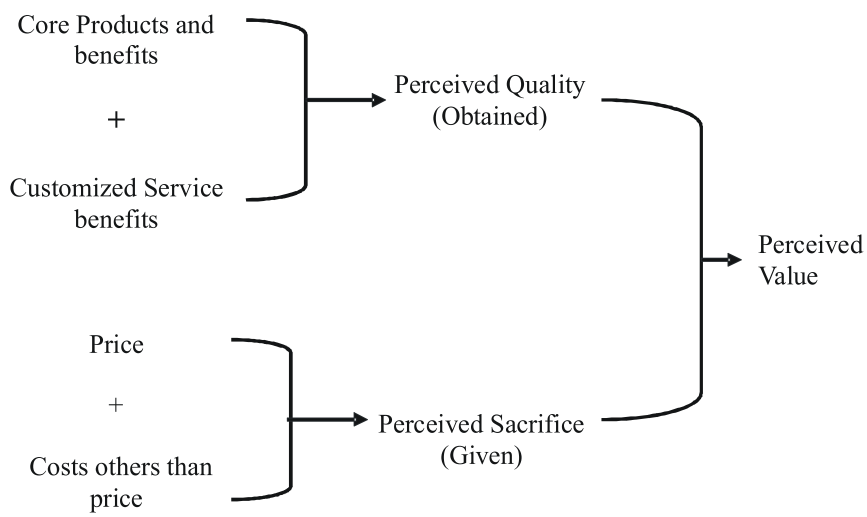


Fig. 10.1 *Customer Value Orientation*

Step-3: Customer Loyalty

This step focusses on the integration of the internal processes of an organization with the customer in creating a community.

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Most companies focus on attracting and retaining customers. on pulling customer and holding them. In order to meet this requirement, companies require e-commerce solutions and e-CRM that is customer directed. By using e-CRM, both the parties benefit. Customers benefit since they can access information on demand, have to spend less for services and get better discounts, whereas organizations gain from increased profits and higher cost savings.

Phases of E-CRM

The following are the three phases of e-CRM:

1. Acquisition
2. Enhancement
3. Retention

Each phase has a different impact on customer relationship.

1. **Acquisition:** Acquire new customers by promoting the product or providing new services or providing better quality with respect to convenience and innovation.
2. **Enhancement:** Enhance the relationship by encouraging excellence in cross-selling and upselling. This will deepen the relationship.
3. **Retention:** Each company's aim is to retain profitable customers and not just acquire new customers. Today, almost all leading companies focus on the retention of existing customers. Retention focusses on service adaptability, i.e., it delivers not what the market wants, but what the customer wants. Customer retention has replaced cost-competitiveness and cost-effectiveness as the biggest concern for companies.

Implementing and Integrating CRM Solutions

Several CRM software packages that are available now help organizations expand their CRM related activities. Organizations have the liberty to choose any of these packages or build and design their own solutions. The following important points need to be considered to implement CRM in an effective way:

- Adoption of customer-focussed managers for better satisfaction
- Creating an organization that follows a customer-focussed culture
- Developing an end-to-end process for serving customers
- Tracking every aspect of selling to existing as well as prospective customers
- Encouraging the habit of asking questions when helping customers with problems

Moreover, when introduced into a company's other information systems, CRM solutions prove to be more effective. One example is the Transaction Processing System (TPS) which processes real-time data. This data is further used by the sales and finance departments to quickly and accurately calculate the financial position. This information, when transferred back to CRM, can prevent customers from ordering an item that is unavailable.

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Use of E-CRM

CRM covers the entire gamut of customer-related interactions and business. A commendable CRM program is one that not only acquires customers and provides them service, but also retains them. This can be done by practising the following:

- Providing round-the-clock technical assistance and customer service
- Offering methods to manage and schedule follow-up sales calls
- Recognizing customer's value and developing suitable service strategies for all customers
- Storing information regarding customer preferences in order to target customers selectively
- Tracking all communication pertaining to a customer
- Providing a system to rectify service insufficiencies
- Providing a system to schedule and manage repair and maintenance and on-going support
- Identifying potential problems before they occur
- Providing a method to handle complaints and issues

Failure of E-CRM

Designing, creating and implementing IT projects is not an easy task. It is considerably risk prone since it involves a lot of money and a high chance of failure. Nonetheless, the fact that the failure rate of CRM has dropped from 80 per cent to 40 per cent is indicative of a positive trend. The following are the major issues that are related to CRM failure:

1. Intangible benefits are not easy to measure or value.
2. It is difficult to identify specific business problems and rectify them.
3. Absence of sponsorship from the active senior management.
4. User acceptance is not upto the mark.
5. Failure to automate a badly defined process.

E-CRM vs CRM

Table 10.1 *E-CRM vs CRM*

E-CRM	CRM
1. It provides information in response to specific customer inquiries.	1. It has the uniform message of 'Push and Sell' for all customers.
2. Promotion and discounts are offered to individual customers.	2. Promotion and discounts are the same for all customers.
3. Pricing of products is negotiated with each customer.	3. The sellers set the pricing of products for all customers.
4. New product features are created in response to customer demands.	4. CRM is determined by the seller, based on research and development.

10.4 ARCHITECTURAL COMPONENTS OF A CRM SOLUTION

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In this section, you will learn about the architectural components which are a part of a CRM solution.

Customer's Information Repository

CRM is misunderstood by many as a database of customers which will be used in future for customers' segmentation and servicing. Many companies do use customer database for marketing.

They collect a pool of customer data from various demographic and geographical segments and put them together in a database system. This is often called the customer warehouse. Mostly information about potential customers is stored here. This information is used for marketing after selecting the target segment from the database.

CRM is but a broader and much refined term. It does not only deal with mere saving of customer information, but it is a process of flow of information across the organization. CRM reports might be generated by the Marketing department exclusively because they are the ones who have access to the customers directly. But after the reports are saved in the customer warehouse, they are used strategically to take decisions. CRM helps in this decision-making process and thus is not limited to customer database marketing activities. In fact, it would not be wrong to say that customer database is a part of CRM and not vice versa.

Campaign Management

CRM Marketing campaign management includes all the steps which are included in the planning, executing, tracking and analysis of direct marketing campaigns. These make an entire lifecycle of a marketing campaign. The same applied for the CRM campaigns too. This starts from the inception and goes on to launch to evaluation of the final result of the campaign.

After the campaign is complete, it will have to be evaluated through analytics.

Event Triggers

Events today have proven to be a large marketing tool for big corporate houses. The same is because the events now are the heroes when it comes to the most effective promotional tools for the company. This is because this is one media unlike advertising which provides an interactive, two-way communication with the audience. Also, with an event that consumers can actually see the product and feel the qualities they are looking for in a tangible manner. The same cannot be done in case of the other types of media. Also, the Events play as a vital gateway for the face-to-face experience which the consumers have with the company. It is through the events that the consumers can experience the product or service. This experience

could become a motivation for the purchase decisions for the company. It can be said that this creates bonds with customers which other media like advertising do not. Also, the media like event are also extremely accountable. The event trigger will monitor all the events of CRM for the company.

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Business Logic and Rules Repository

A Business Rule Repository is a special kind of structured data storage. A General Rulebook System manages a General Business Rule Repository — a repository used to record and manage business rules for as many purposes as possible.

This logic and rules repository that is used to manage business rules that are technical artifacts a System Rule Repository. A Business Rule Management System (BRMS) typically manages such a repository. The applications of a System Rule Repository include:

- Traceability between business rules and your systems and automated processes; the ability to perform impact analysis when business rules must change.
- Reusability of business rules throughout systems and automated processes.
- Homogeneous encoding of business rule statements to improve

Decision Support Tools

CRM acts as a decision support tool. The decision support system could be generated with the help of a firm which could help the company predict the behaviour of a new customer. This prediction is presented on a mobile platform. The decision support system is accessed via WCF service.

Higher Level Statistical Analysis, Forecasting and Planning Tools

The CRM software purchase decision depends heavily on what the organization needs from the CRM. The need analysis enables the company to manage prospective vendors and their true salespersons. Targeted marketing, richer customer data, integration of applications, centralized database, generating more leads, leads conversion, efficient reporting, mobile connectivity are some of the factors that you need to consider.

Firms try to deal with the dangers of the bullwhip effect through the forecasting of demand. This is important because demand is rarely stable. Such variability often means that firms need to keep a degree of safety stock; effectively an inventory buffer. The further up the supply chain towards raw material producer, the greater the observed demand and therefore the greater the safety stock that is required. When demand rises in a given period, downstream suppliers increase their orders, whilst during falling demand, the converse occurs. Since fluctuations in demand are more pronounced up the supply chain, this increases the size of the oscillations faced through the supply chain.

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True Channel Management and Workflow Management

There is a contact management system in the SFA which records and tracks every stage in the sales process. This will also include linking the various channels involved in the CRM activity. This could be finding a prospective client, and the process form the initial contact to final sales. Some SFA applications could also give insights into opportunities, sales forecasts territories, and workflow management.

Collateral Management

Collateral management is essentially moving financial products between two trading counterparties to cover the exposure of the underlying portfolio. If that made no sense, think about it in terms of a paying a mortgage on a house. If the borrower defaults on their payments, the mortgage provider will then have the right to seize the house. Collateral management in CRM pertains to the security of the marketing and sales documents.

10.5 ELECTRONIC CUSTOMER RELATIONSHIP MANAGEMENT: NEED, ARCHITECTURE AND APPLICATIONS

We have already discussed the need, architecture and applications of E-CRM in the preceding sections, in this section, the concept is recapitulated with the help of its applications and discussion tools available in the market.

E-CRM(E-CRM) has been widely implemented for the company's interactions with clients, customers, and sales prospects. (Mark Humphries, Michael W. Hawkins, Michelle C. Dy (1999)

This also engulfs technology to automate, organize, and synchronize business processes which include the primary activities like sales activities, customer service, marketing, and technical support.

Marketing

E-CRM systems can be used for marketing as the enterprise can now judge and target potential clients. This generates leads for the sales team. (The marketing capability of the E-CRM would be in measuring multi-channel campaigns, like telephone, email, social media, search, and direct mail. The Metrics monitored will entail the responses, deals, clicks, leads, and revenue.

Also, the Prospect Relationship Management (PRM) solutions can track customer behaviour which can be taken form the first contact to sale, along with the active sales process.

Customer service and support

E-CRM software also has the ability to assign, create, and manage requests that are made by the customers. For example, a Call Center software that direct a customer to the agent who could help them with a said current problem.

Appointment

The E-CRM can help the MIS in creating and scheduling appointments with customers. This is by far a central activity for most of the customer-oriented businesses.

Customer support, sales, and service personnel can spend a part of their time to talks to the customers and prospects by a variety of means so that they could fix a time and place for meeting and the sales conversation would be further propagated for the delivery of customer service.

Analytics

The analytics capabilities can be joined with the applications for marketing, sales, and service. The same could be complemented and augmented to separate, customized applications for analytics along with business intelligence.

Sales analytics could help companies monitor the client actions and preferences, by the techniques of sales forecasting and data quality.

Non-profit and membership-based

Many systems for the non-profit and membership-based organizations could be crucial in tracking constituents and the involvement of the same in an organization.

The E-CRM could help in tracking fund-raising, membership levels, demographics, volunteering, membership directories and communications with individuals.

Many companies like Microsoft have designed good E-CRM software for various customized business need. Most of the E-CRM software are easy to use with simple folder grouping and searching features. The calendaring, scheduling and messaging features are designed to be very stable and scalable to accommodate growth and integration.

E-CRM Live formerly known as Microsoft E-CRM online is web-based E-CRM that is as fast as the internet connection. Experienced Microsoft E-CRM support is E-CRM software that gives the business correct answers faster. E-CRM consulting and pre planning can lower the price of E-CRM significantly. Example of some of the E-CRM software in the market is given below:

1. ACT!

Act started in 1982 as the first contact manager and has grown to become the most popular with over 5 million users, 10 times more users than its closest competitor. It is low risk E-CRM software to be used by a few independent people. With a great number of add on products local training for this software is easily available(Paul Greenberg - 2004). For a requirement of forms-based program that has history, ACT is the most appropriate software. Act software price varies based on version and number of users.

2. SalesLogix

This software was one of the first true Sales Force Automation (SFA CRM) products designed by the inventor of ACT. It is easier to use than ACT, is feature rich and can be tailored to fit and integrated with financial accounting systems and business processes.

Also know as Sage CRM SalesLogix it is ideal for mobile because of its opportunity focus, robust database SQL or Oracle and proven synchronization engines. Saleslogix consulting can make Saleslogix Blackberry CRM and mobile flexibility offerings work well.

3. Goldmine CRM

Growing out of similar contact management roots as ACT, known for turning contacts into gold, Goldmine CRM software is rapidly deployable to centralize data for team based selling. Goldmine database software has service desk heat integration strengths with timed email sales processes and also offers free industry templates.

4. Telemagic

Started in 1985 as the first customizable contact manager CRM. It is a mature sun setting product and good if a company wants to run on older hardware and software at a fixed low cost and is still available as a Dos, Windows 16 or Windows 32 bit application. It however can cater to a size of 25-50 representative teams only.

5. Salesforce CRM

Salesforce CRM is targeted at the need of the organization of Sales consulting, comparing and planning for Salesforce. It primarily focuses on the sales and marketing department activities and can help accelerate the same.

6. Sugar CRM

In open source customization architecture, the leader is Sugar CRM with MySQL, PHP and Apache features. For organization with an open source IT mandate and a smaller team of sales reps, Sugar CRM is the most appropriate because it is not influenced by vendor interference and macroeconomic market forces.

The company Parle Agro primarily uses the CRM of Saleslogix for its firm. The problem however is in understating this as a part of an effective IT applications. The company has been analysed to have many a wrong impressions about the CRM software package implemented in the company (Paul Greenberg - 2004).

Check Your Progress

5. What is permission marketing?
6. State the meaning of 'personalization' dimension of CRM.
7. What are the factors which help in deciding the type of software for CRM?
8. List the applications of a System Rule Repository.

10.6 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

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1. It might be true that the initial input, that of customer perception and data will be collected generally by the marketing department. This is so because they are directly in interface with the consumers in the market. However, this fact does not limit the uses of CRM to only the marketing department.
2. E-CRM helps form an efficient relationship between three entities the company, customers and employees through Web based technologies.
3. The following are the examples of information stored and managed by E-CRM for customer information database: the information pool of the customer name, address, date of transactions, pending transactions, issues and complaints, status of order, shipping and fulfillment dates, account information, demographic data, repeat customer etc.
4. Marketing automation has several benefits including providing analytics related to segmenting customers based on certain traits for targeted marketing promotions, providing lead-nurturing facilities as well as providing an overall analysis of the performance of the campaign once it ends.
5. Permission marketing is the term of marketing when the marketers obtain permission before advancing to the next step in the purchasing process.
6. The 'personalization' dimension of CRM talks of tailoring the website for each *individualized* shopper needs and preferences. This encourages one-to-one communication.
7. For deciding the type of software for CRM, the following factors are considered: the size of your business, present number of users, the goal of the organization and future strategies will decide the cost of the software and the total cost of ownership.
8. The applications of a System Rule Repository include:
    - Traceability between business rules and your systems and automated processes; the ability to perform impact analysis when business rules must change.
    - Reusability of business rules throughout systems and automated processes.
    - Homogeneous encoding of business rule statements to improve

10.7 SUMMARY

- CRM (customer relationship management) is a set of information used for methodologies, software, and Internet capabilities which help the organization manage well their customers and his needs.

- E-CRM is the use of Web or Internet based applications like e-mails, chatrooms, social media, forums, etc., to achieve the objectives of CRM for an organization. Its primary purpose is to automate the process of marketing and customer relationship through enhancing or rather customizing the products and services to meet the customer's individual needs. There are several benefits of e-CRM; it helps companies increase the efficiency of their processes, help the customer's meet their needs from those products and services, increase customer loyalty and relationship, cost reduction and increase in revenue of the businesses.
- The E-CRM strategy of every company will vary according to their respective customers. Thus, it is very important to understand and chose the right strategy to implement E-CRM successfully in the organization.
- E-CRM is a customer driven system. The purpose of E-CRM is the better servicing and satisfaction of the customer for repeat business and thus profitability of the company. E-CRM helps business organizations many ways.
- Sales force automation (SFA) is a software used to streamline all phases of the sales process. Thus, through the process, it minimizes the time which a sales representative has to spend on each phase. Now the company will have to keep fewer sales representatives for their clients. CRM has more in common in sales force automation since it establishes connection with the customers in relation to the sale of the products and services. CRM is sales focused, in the sense that it integrates data related to not only current but potential customers.
- Marketing automation, on the other hand, as the name suggests deals with the concept of automation brought in for marketing activities. Its primary job is to streamline and automate marketing related software and processes.
- Enterprise customer relationship management is suitable for companies which have multiple teams servicing old, new and potential clients in different capacities in different sub-units of the company.
- Most organizations have similar expectations from a CRM solution. There are certain factors that companies should consider when selecting a CRM so that it suits the business practices and customer target. These factors should gel with the organization's people, processes, and technology that will play a role in the effective working of your CRM solution.
- E-CRM involves the effective management of customer relationships by using information technology. Some of the benefits of e-CRM solutions are decreased costs, increased revenues and improved customer service.
- By using e-CRM, both customers and companies benefit; while customers benefit from accessing up-to-date information, less cost and better services, the companies benefit from high profit and cost savings.

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- The architectural components which are a part of a CRM solution include Customer's Information Repository, Campaign Management, Event Triggers, Business Logic and Rules Repository, Decision Support Tools, etc.
- E-CRM software also has the ability to assign, create, and manage requests that are made by the customers.
- The E-CRM can help the MIS in creating and scheduling appointments with customers. This is by far a central activity for most of the customer-oriented businesses.
- The analytics capabilities can be joined with the applications for marketing, sales, and service. The same could be complemented and augmented to separate, customized applications for analytics along with business intelligence.

10.8 KEY WORDS

- **CRM (customer relationship management):** It is a set of information used for methodologies, software, and Internet capabilities which help the organization manage well their customers and his needs.
- **E-CRM:** It is the use of Web or Internet based applications like e-mails, chatrooms, social media, forums, etc., to achieve the objectives of CRM for an organization. Its primary purpose is to automate the process of marketing and customer relationship through enhancing or rather customizing the products and services to meet the customer's individual needs
- **Sales force automation (SFA):** It is a software used to streamline all phases of the sales process. Thus, through the process, it minimizes the time which a sales representative has to spend on each phase.
- **Marketing automation:** It deals with the concept of automation brought in for marketing activities. Its primary job is to streamline and automate marketing related software and processes.
- **Enterprise customer relationship management:** It is suitable for companies which have multiple teams servicing old, new and potential clients in different capacities in different sub-units of the company. It allows an automated and streamlined process in which all customer-dealing service personnel are equipped with information and processes that is being implemented across the enterprise.

10.9 SELF ASSESSMENT QUESTIONS AND EXERCISES

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Short-Answer Questions

1. What is E-CRM?
2. Write a short note on marketing automation.
3. What is Enterprise Customer Relationship Management?
4. Briefly explain the concepts of permission and personalization marketing.
5. List the ways of creating a customer based in E-CRM.
6. Write a short note CRM processes.
7. Mention some of the popular E-CRM software available in the market.

Long-Answer Questions

1. Discuss some of the common notions related to the concept of CRM.
2. Describe the benefits of E-CRM.
3. Explain the architectural components of E-CRM.

10.10 FURTHER READINGS

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UNIT 11 SUPPLY CHAIN MANAGEMENT AND ELECTRONIC SCM

Structure

11.0 INTRODUCTION

With customers demanding more and competition escalating, a single company cannot successfully compete by itself. Therefore, firms seek to secure better performance through inter-firm linkages to perform better than it would be possible by firms operating individually. This is the strategic role of supply chain management (SCM).

Supply chain management (SCM) is the delivery of a product at the right time, place and price. Not only is supply chain management a leading cost-saving technique and means of revenue enhancement, it is also a competent strategy of business transformation. What is exclusive to SCM is that it combines the organization's internal system with those of its partners, customers and suppliers. As a strategy, it finds versatility through such technologies as the Internet, the electronic data interchange, transportation and so on. In this unit, you will learn about the goals, functions and strategies of SCM along with the components, benefits and implementation of electronic SCM.

11.1 OBJECTIVES

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After going through this unit, you will be able to:

- Discuss the goals and functions of SCM
- Explain the strategies of SCM
- Describe the components and benefits of Electronic SCM
- Examine the concept and implementation of electronic logistics

11.2 SUPPLY CHAIN MANAGEMENT: GOALS AND FUNCTIONS OF SCM

Supply chain management is the process of planning, implementing and controlling operations for serving customers as efficiently as possible. It encompasses all activities involved in sourcing, procurement, conversion and logistics. This is reflected in the operations of the tiffin-wallahs, which focusses on the optimization of the activities in the supply chain with a view to transporting the finished product using various modes of transportation to distribution centres, and ultimately to customers. The entire process of tiffin-box collection, delivery and return journey of the tiffin-box is a perfect example of excellence in SCM.

Need for a Supply Chain

In 1958, J. Forrester wrote an article in the Harvard Business Review regarding system dynamics and its impact on the firm's performance. What he wrote has resulted in changing the traditional ways of thinking about the supply function. He wrote:

> Management is on the verge of a major breakthrough in understanding how industrial company success depends on the interactions between the flows of information, materials, money, manpower and capital equipment. The way these five flow systems interlock to amplify one another and to cause change and fluctuation will form the basis of anticipating the effects of decisions, policies, organizational forms, and investment choices.

The supply chain concept emerged from observations on the retail trade. Forrester had noticed that when a company ordered stock from a distributor on the basis of its observed demand, and the distributor placed an order on the manufacturer, due to demand uncertainty, there was a tendency for small fluctuations in inventory levels of the company to occur and magnify.

Through a simulation model, Forrester showed the impact of information flow on production and distribution performance of firms. When a number of stages were involved in bringing the product to the company, in trying to reduce

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these fluctuations, each stage took a particular action, which ended up magnifying the fluctuations in inventory. Ultimately, this created a significant lead-lag effect and a change in amplitude in the inventory, which hurt the performance of companies in the entire network.

This enlargement of fluctuations not only created disruptions in the supply chain, but also hurt relationships between different stages, as each stage assigned blame on other stages of the distribution network for the fluctuations. Each stage felt that it was doing its best; therefore, by putting the blame on others, it resulted in a loss of trust along the entire distribution network. This lack of trust further accentuated the situation and made coordination efforts more difficult. Ultimately, it led to further 'boom and bust' cycles.

Forrester Effect

All firms experience these excesses and shortages in inventory. Several industries, especially FMCG companies, are prone to 'boom and bust' cycles. Each stage of the distribution network, due to its dynamic character, in optimizing its local objective, propagates, magnifies and enlarges the fluctuations in inventory throughout the entire distribution network. The effect is known as the 'Forrester Effect'.

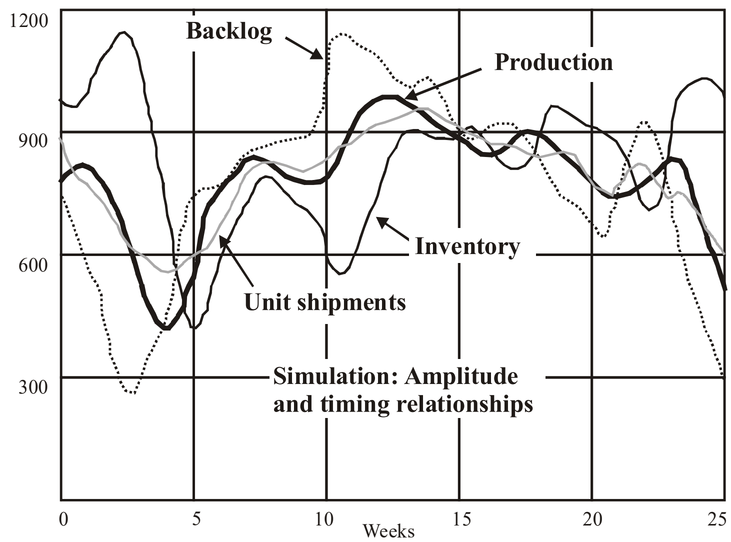


Fig. 11.1 *Forrester Effect*

Figure 11.1 shows how, based on consumer sale numbers, there is a backlog with each succeeding cycle. The retailer places orders with the wholesaler. The wholesaler places orders with the manufacturer and from the manufacturer the order goes on to the suppliers. Since companies in the distribution network do not have complete information about the requirements of others, inventory levels go

up disproportionately. The figure shows that the amplitude of both the backlog as well as the inventory is much greater than the amplitude of the production activity. This is a result of increasing demand uncertainty in the different stages of the distribution network. Each stage has a magnifying effect on the next stage in the network.

'Forrester effect' is now popularly called the 'bullwhip effect' and shows how information gets distorted as it moves along the network and results in excess inventory at times and inventory shortage at other times. With each stage having very different estimates of what demand looks like, it results in the lead-lag effect and a change in amplitude in the inventory, which in turn, creates two possible situations:

- Too much stock that results in increase in costs; storage and handling, insurance, interest, etc.; loss of productivity due to existing inventory; high opportunity cost; and stockpiling of unsold stock, etc.
- Too little stock that results in the firm's inability to cope with demand, which results in loss of customers, and delays that often halt production, which leads to idle labour and machinery, and loss of discounts for bulk buying, etc.

Forrester effect increases the following: manufacturing cost, inventory cost, replenishment lead times, transportation cost, and labour costs associated with shipping and receiving. It also hurts the level of product availability and results in more stock outs, and lower profitability.

Core Concepts of Supply Chain

Although it took a while for the implications of the Forrester effect to be noticed, to sink in, the concept of 'supply chain' finally did come into being in the 1990s. The two main concepts that form the foundation of the supply chain are:

i) Products reach the customers after passing through organizations. That is, practically each and every product is a result of the combined effort of a number of organizations. All these organizations put together are referred to as the supply chain. A supply chain typically comprises suppliers and distribution, that is, upstream as well as downstream.

ii) To ensure that each stage of the supply chain gains maximum profits, organizations have to reduce or altogether erase the internal as well as the external conflicts that arise. The total chain of activities involved in delivering the final product to the end user needs to be managed as a whole.

As the story of the semi-literate tiffin-wallahs shows, a world-class supply chain basically requires the coordination of information and activities from the housewife (she supplies the tiffin-box and is considered as the supplier in the

supply chain context) to the householder (he receives the tiffin-box and is the client), trust between the tiffin-wallahs (firms), and the management of relationships (NMTBSCT).

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How does this supply chain system work? The tiffin-box is ready and kept outside the client's residence by the housewife at 8.25 a.m. At 8.30 a.m., the tiffin-wallah arrives, picks up the tiffin-box and moves on, knocking at the door only if he finds that the tiffin-box is not outside. Under normal circumstances, there is no interaction with any member of the client's household. By 8.38 a.m. the tiffin-box is placed on the bicycle or the pushcart together with other tiffin-boxes collected from other customers.

Bicycles and pushcarts drawn by individual tiffin-wallahs arrive from various collection centres to the suburban railway station by 9.20 a.m. At the stations, the sorting operation begins with tiffin-boxes being sorted according to destinations and placed in cartages that are specific to each destination. The cartages come in two standard sizes, accommodating 24 and 48 tiffin-boxes each. This process is completed by 9.41 a.m., and that is when the suburban train arrives. The cartages, normally numbering five or six, are loaded into the special compartment located next to the driver's cabin.

The train arrives at one of the major hubs by 10.21 a.m. The cartages are unloaded and bundled with those arriving from other collection centres. They are re-sorted according to destinations. By 11.05 a.m. the cartages are put into the suburban train for onward journey to their final destination terminals. When the suburban train reaches the terminal station, cartages are unloaded and tiffin boxes re-sorted, now according to specific delivery routes.

By 12.10 p.m. the tiffin-boxes are placed in destination-specific cartages and hitched, typically on to bicycles or pushcarts for delivery to individual clients and delivered at the client's workplace, latest by 12.30 p.m. The delivery process is reversed in the afternoon. The empty tiffin-boxes are picked up between 1.15 p.m. and 2.00 p.m. so that they can be returned to the client's home early that evening (e.g., by 5.30 p.m.).

Clearly, the whole operation is a marvel of product movement (coordination and multi-tasking), relationships (trust and role changes) and perfect exchange of information (coding system, rail timings, and knowledge of Mumbai's geography). Excellence in a supply chain is achieved through three factors:

- Proper information use
- Proper product movement
- Proper relationship management

Factors that assist in enhancing information use, relationships, or product movement, help in improving the supply chain.

11.2.1 Functions of SCM

SCM is involved with integrating three key flows, i.e., of products/materials, information and funds, between the different stages, across the boundaries of the companies:

- **Product/Materials:** This is the most obvious and visible part of the supply chain. Physically, the flow manifests itself in the form of goods and services. This is also called the 'value flow'. Goods and service flows follow a similar sequence. For example, goods flows constitute raw material (including material being transported), work-in-process, finished goods, and spares, and reverse flows due to returns, rework or recycling of the goods. The vendor side of these flows is called 'upstream' and the flows towards the customer are referred to as 'downstream'.
- **Flow of Information:** The partners in a supply chain are able to coordinate plans in the long run if there is proper flow of information. Appropriate flow of information also allows the partners to control, monitor and keep a check on the daily flow of materials/goods to the chain. It consists of flows both from vendor to customer and from customer to vendor. The downstream flow of information has important components such as capacity estimates for plans, stocks available, dispatch advices, stock transfer notes, quality assurance reports and warranties. The upstream components of information flow are inputs for forecasts, marketing plans, dispatch plans, production plans and procurement quantities and timing, orders from customers and dealers, quality feedback, and warranties.
- **Flow of Funds:** This is the commercial part of the supply chain, and runs counter to the direction of the value flow. It reflects the money paid with respect to the transfer of title and/or service delivery in the supply chain. Other features to cash flow are credit periods/advances for payments from customers/dealers, and to vendors. The cash flow determines how the various actors in the supply chain finance the value flow.

While adopting an SCM philosophy, firms must first put into place management practices that allow them to comply with this philosophy. There are a number of activities that are necessary for the successful implementation of an SCM philosophy. The primary SCM activities are as follows:

- Integration of behaviour and processes
- Cooperation
- Sharing of goals and partnership
- Mutual sharing of information
- Sharing of risks and rewards

In order to be successful and effective in a competitive environment, organizations must show integrated behaviour with the supply chain partners, that

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is, suppliers, carriers and manufacturers. This integrated behaviour helps in a dynamic response to the needs of the end user. The tools for managing customers' demands and integrating their needs across an organizations' value chain are customer relationship management (CRM) and demand planning. In combination with tried and tested business strategies and processes, these tools produce a uniform picture of demand that can then lead to behaviour integration. This in turn directs subsequent planning and operations, facilitating the integration of processes. The final result is an agile firm equipped to tackle or handle market changes.

Integrated behaviour and integration of processes together lead to information sharing.

Information sharing translates into the willingness to let other supply chain members access strategic and tactical data. It refers to sharing of information openly. The information could be related to forecasts, marketing strategies, inventory levels and sales promotion strategies. Such sharing of information results in the reduction of uncertainty between partners and leads to better performance.

Sharing channel risks and rewards is also essential for effective SCM. This kind of sharing among supply chain members, in the long run, gives rise to competitive advantage. Some experts feel that to ensure long-term focus and cooperation among the members of the supply, risk and reward sharing is important. Risk and reward sharing is a difficult task. Though conceptually it is possible, no organization likes to forego its revenues and profits, and it becomes very hard unless members can sell the benefits to the organization.

Cooperation among the channel members begins with joint planning and culminates in joint control activities for the evaluation of the performance of the supply chain members. It happens at several management levels involving cross-functional coordination across the channel members.

Getting people to cooperate is the most difficult part of SCM, even when it may produce superior mutual outcomes. As mentioned earlier, people are generally concerned about themselves and would like to promote their individual parochial objectives, and cooperation limits the freedom of firms to act in their own interest when performing similar or complementary activities.

A successful supply chain depends on the common objective and goal of the members of the chain, that is, customer service. By focussing on a common goal, the supply chain members find themselves working towards a form of policy integration. Most organizations go through four stages of policy integration:

- **Stage 1:** At this point, the supply chain consists of fragmented operations within the individual firm. It follows traditional concepts and is characterized by segregation on the basis of functions, staged inventories, independent control systems and incompatible procedures.

- **Stage 2:** Here, the process of internal integration begins. First, cost reduction is focussed upon instead of performance enhancement. There is an emphasis on internal trade-offs and reactive customer service.
- **Stage 3:** The firm aims at internal corporate integration. It is characterized by full visibility of purchasing through medium-term planning, distribution, tactical focus, focus on efficiency, use of electronics support for linkages, and a consistent reactive approach to the final users.
- **Stage 4:** This stage is characterized by strategic focus. The organization achieves supply chain integration by extending the scope of integration beyond the organization, that is, to the suppliers and the end users.

All firms go through these four stages. Ultimately, policy integration is made possible by the supply chain members trying to create compatible cultures and management techniques. Collaboration refers to the joint working of two or more independent firms on the execution of various operations within the chain. Their combined efforts yield better results than their isolated activities. This can be achieved through the continuous effort on the part of cross-functional teams, internal supplier personnel and other external/third-party service providers.

Firms that have reached stage 4, proceed to build-up a series of partnerships. Successful partnerships are aimed at the integration of the supply chain policy. This helps avoid redundancy and overlap. However, at the same time, this results in effective participation at lower costs. The organization should select a small number of partners to facilitate cooperation. It can claim to have an effective SCM when these partners build and maintain long-term relationships where the relationship time horizon goes beyond the life of the contract—may be indefinitely.

SCM extends the supply chain philosophy across all members of the chain. By integrating behaviour and processes, sharing information, planning in collaboration with each other, sharing the risks and rewards, cooperation, goal sharing and partnerships, the operations in the supply chain can be streamlined and the profitability of all the members in the chain improved.

Dell and Wal-Mart have been pioneers in the concept of SCM and reflect some of the most successful examples of effective SCM. What is interesting is that they have created world-class supply chains by tackling the 'Forrester Effect' from different ends. Dell has been a pioneer in the build-to-order ('pull') cycle, i.e., reducing forecasting-based demand uncertainty, and Wal-Mart has led the way in the use of information flow to reduce demand uncertainty.

At Dell Computers, an order from the customer initiates manufacturing. This is referred to as build-to-order. Dell does not have retailers, wholesalers, or distributors in its supply chain. While other computer companies must stock a month of inventory, Dell carries only a few days worth of stock. It plans, orders and signals suppliers every two hours, which enables it to manufacture and deliver

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exactly what its customers want. In fact, many of the components are delivered to Dell within a few hours of assembly and shipped to the customer.

The success of Wal-Mart is drawn from new technologies combined with new ways of doing business. It has used the power of information flow to create a global supply chain that is super efficient. Their centralized database as well as the connectivity between stores and distribution centres ensures automated replenishment and smooth functioning of the supply chain at Wal-Mart. Its network successfully links more than 2,400 stores, 100 distribution centres worldwide, and 950,000 Wal-Mart associates.

The success of supply chains is based on the ability to deliver superior cost, quality, delivery, and technological performance. These, along with the process linkages between the participants, are important factors to make a successful supply chain.

Finally, it is essential to appreciate that in order to operate a supply chain successfully the intra-organizational and inter-organizational supply chain processes must be clearly understood. Where organizations do not keep this in view or take too much time to evolve inter-organizational processes, it generally becomes too late for the supply chain to succeed. There are more failures in SCM than there are successes.

11.2.2 Goals of SCM

The major goals and functions of an effective SCM for a company have been listed below are:

1. Offerings — This helps to develop and supply the innovative products or services
2. Platform — This help to use common components or building blocks which will further create derivative offerings
3. Solutions — This is the dimension which creates integrated and customized offerings which could help solve end-to-end users problems
4. Customers — This will help to judge the unmet customer needs and serve the under-served customer segments
5. Customer experience — This would help to redesign customer interactions which could be done at all touch points and moments of contact
6. Value capture — This will redefine how the company will get paid and create the innovative new revenue streams
7. Processes — This dimension will list and redesign core operating processes which could enhance the efficiency and effectiveness of the technology process
8. Organization — This is the dimension which will change the form, function, activity of the organization

9. Sourcing — Here one will have to think differently and judge the sourcing and fulfilment
10. Presence — This will create new distribution channels along with the innovative points of presence, which will include the offerings which can be bought or used by the customers
11. Networking — This will create network-centric intelligent along with integrated offerings
12. Brand —This will be the dimension of leverage a brand has into the new domains.

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11.2.3 Strategies of SCM

Product attributes, market characteristics and the customer requirements are the factors which affect the selection of SCM. The primary aim of designing an SCM strategy is to reduce costs and increase efficiency. Demand and life cycle of the product affect the nature of SCM too. There are four major strategies of SCM: lean, agile, postponement and speculation.

- With the motive of reducing costs and enhancing profitability, the lean supply chain strategy aims at reducing wasteful and non-value adding activities from the supply chain.
- Flexibility and speed form the crux of the agile supply chain strategy which aims at helping the companies adapt to the dynamic customer demand ensuring high customer satisfaction.
- The risk of incorrect manufacturing order or wrong inventory is dealt with by the postponement SCM strategy. This strategy dictates that the management does not start production before the actual customer order.
- The speculation SCM strategy promotes the production of bulk order so as to take the benefit of increasing savings. It also propagates the increased use of warehousing, transportation and resources.

Corporate Production Strategy and SCM

Through SCM firms can examine ways of being more efficient, especially for an overall low-cost strategy, and well as adding more value to end customers, important for a differentiated strategy.

In the case of firms that adopt an overall low-cost strategy, the goal is to increase sales volume whilst also reducing unit costs because this helps to improve the margin achieved by the firm. Over time, a firm can capitalize on economic of scale through investment in infrastructure, as well as learning curve effects and perhaps more effective purchasing decisions, supply chain efficiencies and better logistics management. When adopting such a strategy, it may also be pertinent to not simply optimize individual links within the supply chain but examine how efficiencies can be made across the supply network since it can easily be possible

for a distant supplier in the supply network to disrupt the entire supply chain. Nonetheless, many efficiencies are likely to be found in the immediate supply chain because the firm has greater control over this part of the supply network.

In the case of firms pursuing a differentiated strategy, these aim to focus on those aspects of their products or service provision that add most value in the eyes of the consumer. Whilst controlling costs is still important, focus is placed on the firms' intangible assets and its ability to leverage these within the value chain. A critical component of this production strategy is to understand which parts of the supply network should be kept in-house and which should be outsourced, or perhaps even acquired. In-house activities are those that add greatest value to the firm and where it has particular competence, whilst the outsourcing of supply chain activities should take place for more peripheral activities within a firm's value chain.

In reality, just as firms do not always follow one of the three generic strategies, but a hybrid corporate strategy, so should they look for a hybrid approach to SCM. The key point, however, is that there is alignment between a firm's corporate production strategy and its SCM approach.

There are many strategies which could be applied for an effective SCM. Some of them have been listed as follows:

- **The company has to follow a demand-driven planning and business operating model which has to be based on the real-time demand. For the same, one may need the customer insights and demand analysis.** Thus, the company needs the right prediction of a contingency and has to plan for the same. It has to analyse the risks which are related to the suppliers who might be leaving the business, along with the natural calamities which could affect the manufacturing. Companies also have to change the pricing and promotions strategies which could shape demand and help the product and thus help the company grow its revenue.
- **The second strategy could be to build an adaptive supply chain with the help of a rapid planning.** In case the executives could better understand the demand and risk, then they will be able to adapt their supply chains to changing market opportunities and events.
- Another strategy which the company has to follow is **optimize product designs. The same has to be done for the product management in case of manufacturing, supply and sustainability which could benefit the profitable innovation.** Innovation is thus crucial for being one step ahead of the competition.

The External factors are related to the type and proximity of the external technological knowledge which is to be acquired. It is also dependent on the

availability of finance. At the same time technology absorption depends on some internal factors which include the internal factors related to the companies' internal capabilities which could help them to absorb the new technology and its knowledge.

It is these internal capabilities which could get affected by the external factors. Thus, the external factors will be studied in relation to their effects on the internal capabilities pertaining to the technology absorption.

The Innovation model studies why the people outperform new entrants in technology absorption. It is true that the firm's technology absorption capabilities can become obsolete, but its innovations will remain intact.

Thus, in case we expect a successful technological absorption, then one has to persist on building an innovating firm. For the same the study of the classification of innovations and their impact on the present technological and market knowledge pertaining to the manufacture and technology is crucial.

Check Your Progress

1. What is the Forrester effect?
2. List the factors through which excellence is a supply chain is achieved.
3. Mention the elements on which the success of supply chains is based.

11.3 ELECTRONIC SCM: BENEFITS AND COMPONENTS

The Internet has enabled customers to search for specific products, that too at prices they are willing to pay. Customers are the focus of modern supply chains. It is important for manufacturers to know what their customers want, how to package it, and where to ship it. Customers should be ready to change directions rapidly especially if they are looking for a change. Similarly, manufacturing processes and businesses should be scalable and agile. Manufacturers may be out of business very soon if they do not implement established techniques to succeed today.

A way of communicating and doing business with customers and suppliers is through the Internet supply chain. Cracked and erratic supply chains have become less tolerable mainly because customers are not ready to accept the related costs and extended lead times. It is crucial to remember that the customer is just a mouse click away from your competitors.

Supply chains enable companies to optimize business processes inside and outside the company. They can deliver new products and services to customers where they demand them and when they demand them.

Why E-SCM?

Supply chains have often been seen as rigid sequences of activities that contribute to the manufacture, production and delivery of products. It involves inflexible manufacturing plans, hypothetical shipping schedules and questionable inventory forecasts.

The Internet has changed this conventional process into something which is nearer to science. Organizations benefit from an Internet-enabled supply chain in the following ways:

- Minimize administrative overheads
- Abstain costly disasters
- Reduce the labour cost
- Earn bigger profit margins on completed goods
- Harvest on revenue-producing gains and cost cutting
- Remove outdated business processes
- Accelerate responsiveness and production to customers
- Decrease needless inventory (thereby maximizing working capital)

Customer service can be improved and inventories can be reduced if a company's supply chain is integrated effectively.

It is important to make sure that a company's internal systems work well before they are extended over the Internet. This allows the automated supply chain to generate optimum value.

11.3.1 Components of E-SCM

The following are the five basic components of e-SCM:

i) Plan: The most strategic part of SCM is planning. All that is required is a strategy to maintain those resources that cater to customer's demand for a product or service. To monitor the supply chain, metrics need to be planned and developed. This will help in cutting cost, increasing the efficiency and delivering better quality to its customers.

ii) Source: A source once selected leads to supplier selection for the delivery of goods and services that are required to make a product. Price should be set by companies. Delivery and payment procedures with suppliers should be made by companies along with matrices to improve and monitor the relationships. The inventory of goods and services that you obtain from suppliers is managed by it, together with getting shipments, validating them, moving them to the manufacturing units and authorizing the payments of suppliers.

iii) Make: This stage relates to the manufacturing of activities that are essential for production, testing, packaging and delivery preparation. The most vital

metrics of supply chain are to measure levels of quality, produce output and worker productivity.

iv) Deliver: This part of SCM is also called logistics. It manages the orders receipts from customers, chooses delivery services to send goods to customers, establishes an invoicing system to get payments and sets up a group of warehouses.

v) Return: The difficult part of the supply chain is return. A network should be created that will receive faulty and surplus products back from customers and help customers who have trouble with the products that are delivered.

E-SCM: How it Fulfils Customer Needs

All aspects of a business are covered by SCM. It starts from the raw materials and finishes at the end-user. When you enter a shop to purchase a certain item, try to imagine the sequence of steps that has brought it to the point where you see it. You will find a price tag on the material, with all the details of its date of manufacturing, date of expiry, lot number, etc. The shop has carefully placed it on the shelf after procuring it from a distributor and noting all these details for billing and tracking future complaints. The shop always maintains an inventory of this and hundreds of other products that are available in the store, as well as a minimum stock level and a re-order level.

When you complete your purchase, the point of sale updates this information at various places. The stock level will decrease and revenue will increase. If stock levels reach a certain level then the distributor has to replenish the stock before it becomes zero and the distributor also has to be paid his due amount. This chain is again pushed backwards to the lowest level of the supplier who has to supply the material in time. By this process, there is constant flow of money and material in order to satisfy the needs of the customer.

Actually, a supply chain manages the flow between different stages to maximize productivity and minimize overstocking. The SCM system is a collection of many applications—demand, inventory and transportation planning.

11.3.2 Benefits of E-SCM

The advantages of e-SCM can be divided into two categories:

- Real time advantage
- Strategic advantage

Real Time Advantages

The real time advantages of e-SCM are as follows:

- Global trading capabilities
- Knowledge can be exchanged globally

- Provides enterprise-to-enterprise connectivity
- Provides e-marketplace-to-e-marketplace connectivity
- Provides a specific marketplace

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Strategic Advantages

The strategic advantages of e-SCM are:

- It supports the exchange of information through trading communities such as employees, customers, suppliers, distributors and manufacturers.
- It acts as an interface with any third-party software.
- It is platform independent.
- It is a fully integrated system.
- It allows for rapid deployment and scalability.

11.4 ELECTRONIC LOGISTICS AND ITS IMPLEMENTATION

Physical distribution is the set of activities concerned with efficient movement of finished goods from the end of the production operation to the consumer. Physical distribution takes place within numerous wholesaling and retailing distribution channels, and includes such important decision areas as customer service, inventory control, materials handling, protective packaging, order procession, transportation, warehouse site selection, and warehousing. Physical distribution is part of a larger process called "distribution," which includes wholesale and retail marketing, as well the physical movement of products.

The term Logistics Management is that part of supply chain management that plans, implements and controls the efficient, effective, forward, and reverse flow and storage of goods, services, and related information between the starting point and the end point in order to meet customers' requirements.

Logistics System Analysis

The primary objective of logistics system analysis is the design of logistics system that supports the strategic goals of the organization. Thus, the very starting point of the analysis of logistics management is the understanding of the goals and strategies of the organization. When we say organizations goal and strategy, we mean, the choice of produces, markets to be served, level of service. All these factors affect the procurement, distribution, manufacturing and inventories as must be integrated and support the strategy.

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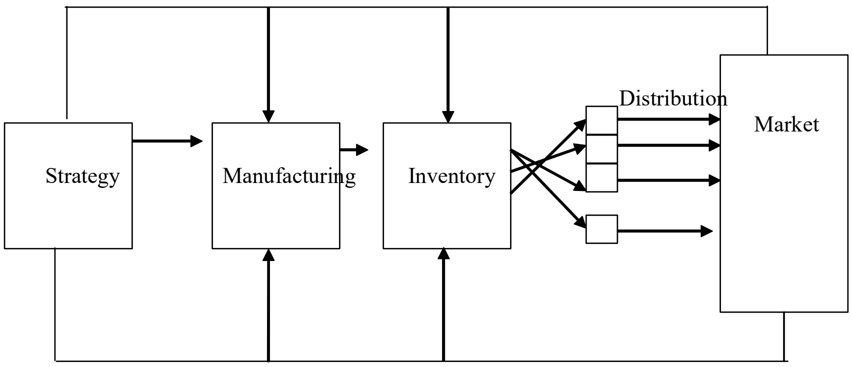


Fig. 11.2 *Logical System Analysis*

Trade-offs of logistics analysis

There are a number of trade-offs that are to be considered. Different elements have a their importance in different industries.

- Transit cost Vs Warehousing Cost: Economies of scale can be obtained by the use of centralised warehousing facility, in most of the industries. With more number of warehouses, the shipment of inventory sent in economical lot size helps in reducing the cost of the final product to the customer. However, numerous warehouses increases the inventory cost.
- Proximity to raw material Vs proximity to customer: It is important to locate the manufacturing unit close the source of raw material. Proximity to the source of raw material is necessary and important for those industries where the transportation cost is usually very high. Service requirement and distribution cost structure might influence the decision of locating the manufacturing unit close to the warehousing facility.
- Logistic Cost Vs Cost of Service: Effective customer service means decentralized location of warehousing facility. In other words, in order to maintain high lever of service the manufacturer needs to have number of warehouses and stocking facility. This increases the inventory cost, the distribution and transportation cost.
- Choice of mode of transportation: While designing the logistics system, the manufacturer must take into consideration the various transportation modes and their implications. The transit mode usually involves a very high cost, high service modes such as air freight, and low cost and low service modes such as railways.

Electronic Logistics

The development of logistics falls into three stages, namely military logistics, business logistics and e-logistics, in which the e-logistics has been the latest word appearing

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in the logistic industry. Presently the e-logistics has been mostly defined. According to the definition of Electronic Logistics, refers to the process which utilizes web technology as an important tool to manage the whole logistic process or some sectors of it. Prof. Zhai Xuewei regards e-logistics as the combination of logistics supporting e-commerce and the electronic technology for logistics. Based on the above definitions and other literature, the author holds that e-logistics, namely e-logistic commerce, which has been characterized with electronic technology, network technology and automation, can be regarded as the integration of information flow, fund flow and logistical service. E-logistics realizes the utility of electronic technology and integration of logistic organization, trade, management and service modes. It is entitled to share data, knowledge and other information with partners in the supply chain. Seen from these definitions, as e-logistics has been combined with the meaning of commerce, then it is also equipped with the same procedure of commerce from negotiation, contract signoff, payment, and implementation to balance counting and utilizes electronic technology in each step.

The Development Patterns Of E-Logistics

Development patterns of E-logistics are divided into two categories. The first one is defined in the e-logistic information market which is a new information system established on Internet. In this pattern, the information about the logistics information of the consignor or about the usable vehicles of transportation companies can be input on the Internet and both the parties can sign a contract in accordance with this information. In other words, the consignor can put such information involving transferred goods categories, quantities and destinations on Internet and the transportation company can provide related information (such as the location of usable vehicles) to the consignor through Internet; and then based on the above information both the parties can sign a contract. The main functions of this pattern include information search, dissemination and bid; other functions mainly refer to providing such services as industry information, goods insurance, logistic tracing, road condition and GPS. For example, National Transportation Trade Market (www.Net.net), as an electronic transportation market, builds a trade Internet for the consignor, the logistic company and the transporter through Internet technology.

The second pattern is based on an e-logistic system specialized in providing supply chain management for logistic enterprises. It is characterized by electronic technology, which utilizes Internet to complete the coordination, monitoring and management of the whole logistic process and provide all mediate services between Internet foregrounding and end customers. Typically, this pattern combines various software technologies and logistic services, in which way the close link among fund flow, logistics and information flow can be completed. What's more, this type of link can provide visibility among enterprises, which enables these enterprises to control and manage storage to a maximum extent. Meanwhile, with the aids of such advanced information technologies as customer management system, the integration of commercial intelligent computers and telephones, geographical

information system, GPS, Internet and wireless net technology as well as such logistics management technology and modes as rationing optimization.

The implementation of E-logistics system would generally imply the following steps: identifying and clearly stating the problems in the SCM side of the business, configuring IT architecture, operationalizing the systems of IT and the particular e-business model, and in the end measuring the performance vis a vis the pre-determined goals.

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Check Your Progress

4. What is the difficult part of the E-SCM?
5. State the very starting point of the analysis of logistics management.

11.5 SUMMARY

- A supply chain is a partnership of firms who are involved in providing a product or service.
- There are a number of stages involved in the supply chain. Generally, more than one player is involved at each stage.
- A typical supply chain may involve a variety of stages that may include—customers, retailers, wholesalers/distributors, manufacturers, and component/raw material suppliers.
- 'Supply Chain Management' (SCM) can be defined as the active management of supply chain activities to maximize customer value and achieve a sustainable competitive advantage. It represents a conscious effort by the supply chain firms to develop and run supply chains in the most effective and efficient ways possible.
- SCM is involved with integrating three key flows, between the different stages, across the boundaries of the companies: (i) flow of information, (ii) product/ materials, and (iii) funds. While the product/service flows outwards from the manufacturer to the customer, both information and funds flow from the customer to the manufacturer.
- Understanding the strategic choices of firms is important in global supply chain management (SCM) because it helps to establish the focus on the company's activities.
- Product attributes, market characteristics and the customer requirements are the factors which affect the selection of SCM. The primary aim of designing an SCM strategy is to reduce costs and increase efficiency. Demand and life cycle of the product affect the nature of SCM too. There are four major strategies of SCM: lean, agile, postponement and speculation.

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- In the case of firms that adopt an overall low-cost strategy, the goal is to increase sales volume whilst also reducing unit costs because this helps to improve the margin achieved by the firm.
- In the case of firms pursuing a differentiated strategy, these aim to focus on those aspects of their products or service provision that add most value in the eyes of the consumer. Whilst controlling costs is still important, focus is placed on the firms intangible assets and its ability to leverage these within the value chain.
- Through SCM, firms can examine ways of being more efficient, especially for an overall low-cost strategy, and well as adding more value to end customers, important for a differentiated strategy.
- Supply chains have often been seen as rigid sequences of activities that contribute to the manufacture, production and delivery of products. It involves inflexible manufacturing plans, hypothetical shipping schedules and questionable inventory forecasts. The Internet has changed this conventional process into something which is nearer to science.
- The five basic components of e-SCM are plan, source, make deliver and return.
- Physical distribution is the set of activities concerned with efficient movement of finished goods from the end of the production operation to the consumer. Physical distribution takes place within numerous wholesaling and retailing distribution channels, and includes such important decision areas as customer service, inventory control, materials handling, protective packaging, order procession, transportation, warehouse site selection, and warehousing. Physical distribution is part of a larger process called "distribution," which includes wholesale and retail marketing, as well the physical movement of products.
- The very starting point of the analysis of logistics management is the understanding of the goals and strategies of the organization. When we say organizations goal and strategy, we mean, the choice of produces, markets to be served, level of service. All these factors affect the procurement, distribution, manufacturing and inventories as must be integrated and support the strategy.
- There are a number of trade-offs that are to be considered. Different elements have a their importance in different industries.
- The development of logistics falls into three stages, namely military logistics, business logistics and e-logistics, in which the e-logistics has been the latest word appearing in the logistic industry.

- E-logistics realizes the utility of electronic technology and integration of logistic organization, trade, management and service modes. It is entitled to share data, knowledge and other information with partners in the supply chain.

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11.6 KEY WORDS

- **Supply chain management:** It is the process of planning, implementing and controlling operations for serving customers as efficiently as possible.
- **Logistics Management:** It is that part of supply chain management that plans, implements and controls the efficient, effective, forward, and reverse flow and storage of goods, services, and related information between the starting point and the end point in order to meet customers' requirements.
- **Electronic logistics:** It refers to the process which utilizes web technology as an important tool to manage the whole logistic process or some sectors of it.

11.7 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short-Answer Questions

1. Write a short note on Forrester effect.
2. What are the three key flows in SCM?
3. List the goals of SCM.
4. Explain the low cost and differentiated strategy in SCM.
5. List the organizations benefit from an Internet-enabled supply chain.
6. Briefly explain the trade-offs of logistics analysis.

Long-Answer Questions

1. Discuss the primary activities of SCM and the stages of policy integration.
2. Describe the components of E-SCM and its benefits.
3. Explain electronic logistics and its development pattern.

11.9 FURTHER READINGS

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BLOCK - IV
WIRELESS APPLICATIONS AND KNOWLEDGEMENT

UNIT 12 WIRELESS APPLICATION PROTOCOL (WAP)

Structure

12.0 INTRODUCTION

Wireless application protocol (WAP) is said to be a communications protocol which could be used for the wireless data access .The same could be done by the mobile wireless networks. WAP improves the wireless specification interoperability. This also enhances the instant connectivity which is present between the interactive wireless devices which includes the mobile phones and the Internet.

WAP functions could be defined as an open application environment which can be created on any type of operating systems. Mobile users would like to use the WAP as the same has the efficiency of delivering the electronic information.

The unit is dedicated to wireless application protocol (WAP) and deals with the architecture, features and working of the same. The unit proceeds with the discussions on wireless technologies, generations in wireless communications, security issues related to wireless communications. In addition to this, you will also learn about the concept of mobile computing in four dimensions and wireless millennium.

12.1 OBJECTIVES

After going through this unit, you will be able to:

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- Understand the meaning and working of wireless application protocol (WAP)
- Describe the architecture of the WAP model and evaluate the significance of each layer of the model
- Classify the basic components of the WAP model
- Examine the wireless technologies of and their uses
- Assess the generations of wireless communications
- Scrutinize the security issues related to wireless communications
- Acknowledge the four dimensions of mobile computing
- Understand the concept of wireless millennium

12.2 WAP: ARCHITECTURE AND WORKING

The WAP forum has developed an open global specification called the wireless application protocol (WAP). WAP allows the mobile user with a WAP device to access and communicate information and services easily and immediately.

A set of communication protocols specified by WAP standardizes the manner in which radio transceivers, mobile phones and other wireless devices can be used to access the Internet, including e-mail, Internet Relay Chat (IRC) and the World Wide Web (www). The traditional desktop Internet is very similar to the WAP model.

Phone.com, a leading cloud-based phone company that provides innovative communications solutions to small businesses, describes WAP as:

WAP bridges the gap between the mobile world and the Internet as well as the corporate intranets and offers the ability to deliver an unlimited range of mobile value-added services to the subscribers—independent of their network, bearer and terminal. Mobile subscribers can access the same wealth of information from a pocket-sized device as they can from the desktop.

Mobile devices must have the following features:

1. Less memory
2. Less powerful central processing units
3. Smaller display
4. Limited input facilities
5. Restricted power consumption

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A wireless data network must have the following features:

1. More latency
2. Less bandwidth
3. Less predictable availability
4. Less connection stability

WAP is an attempt to design a protocol keeping in mind the above factors relating to mobile devices and wireless data networks.

WAP is a set of protocols that specifies a complete framework for mobile Internet access. The WAP forum is an industry association founded in 1997 by Nokia, Motorola, Ericsson and Phone.com. The purpose of WAP is to expand the usages of wireless data by providing a platform for developing new value-added services. WAP brings superior services and content to digital mobile phones and other mobile terminals from the Internet.

The Basic WAP Model

WAP has three main components that are necessary for the protocol to function properly.

WAP Components

1. WAP Gateway
2. WAP Server
3. Client Device

1. WAP Gateway

The WAP gateway provides communication between wireless networks and the Internet. It acts as an interface between telecommunication protocols within the mobile operator's network and Internet protocols.

The main benefits of a WAP gateway include:

(i) The WAP gateway translates the protocols between the Internet and the wireless network.

(ii) WAP content is encoded into a compact binary form by the WAP gateway over air transmission due to efficiency reasons.

2. WAP Server

The second important component is the WAP server. It stores the WAP content. The WAP server can be on a local network or anywhere on the Internet. WAP servers contain Wireless Markup Language (WML), WML Script and Wireless Bitmaps which are all WAP content formats.

3. Client Device

The client device can be a mobile phone, a pager, a Personal Digital Assistant (PDA) or any other WAP enabled device.

Architecture Overview

The World Wide Web Model

The Web or the WWW model is used on the Internet to provide the client with the ability to receive content in a defined data format from Web servers. The standard protocols, like the Transmission Control Protocol and the Internet Protocol (TCP/IP) and Hypertext Transfer Protocol (HTTP) handles the communication. Figure 12.1 shows that to reach the content on the server a Uniform Resource Locator (URL) is used by the clients.

The client uses a Web browser to display the contents provided by the server in a standard format called the Hyper Text Markup Language (HTML) and the script language (Java Script, Visual Basic (VB) Script, etc.,) to enhance the content functionality.

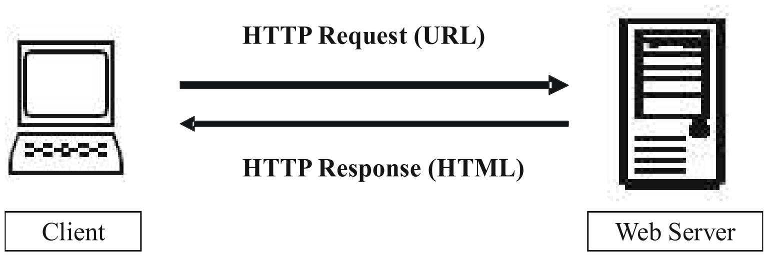


Fig. 12.1 *World Wide Web Model*

The WAP Model

WAP is designed to use existing technology and standards. A browser in a WAP device communicates with the WAP gateway connected to the Internet. The WAP gateway translates requests from the www protocol to stack the WAP protocol and vice versa.

When the browser sends a request to the server, WAP gateway decodes it to plain text and sends the request to the WAP server as the desired content, as show in Figure 12.2. By this method, a content provider only needs to add a few content types to the WAP server to enable the WAP services to be developed, as the user of the WAP device is always connected to same gateway. The Wireless Markup Language (WML) script is the standard content format used by WAP applications. When a server replies, the desired content is sent to the gateway. The content is encoded by the WAP gateway into binary form of WML and sent to the WAP device. This binary encoding is used to reduce network traffic. The textual content is not only compressed, but also all unnecessary spaces and line breaks are removed in this way.

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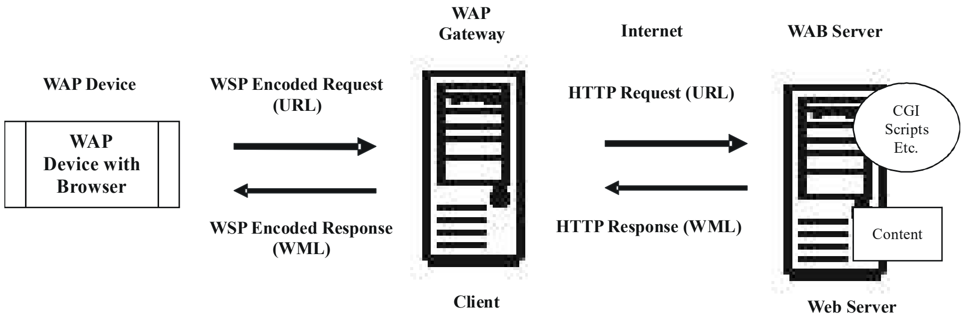


Fig. 12.2 *The WAP Model*

The WAP client communicates with the WAP server by using the WAP gateway. The WAP gateway translates the client requests to www requests before submitting the request to the WAP server.

The WAP Protocol Stack

Wireless Application Environment or Application Layer (WAE)				
Session Layer or Wireless session Protocol (WSP)				
Transaction Layer or Wireless Transaction Layer (WTP)				
Security Layer or Wireless Transport Layer Security (WTLS)				
Transport Layer or wireless Datagram Protocol (WDP)				
Wireless Bearers:				
GSM	CDMA	SMS	GPRS	CDPD

Fig. 12.3 *The WAP Protocol Stack*

Figure 12.3 depicts the wireless application protocol in a series of layers. The Open Systems Interconnection (OSI) model defines a layered framework for generically describing and designing protocols. Similarly, WAP has six layers. Each layer is responsible for managing some part of WAP. The WAP architecture layers are analysed as follows:

1. Application Layer or Wireless Application Environment (WAE)

In the WAP protocol stack the WAE is the uppermost layer. WAE is divided in two logical layers:

(i) The first layer is for user agents

(ii) The second layer is for service and formats

The first layer is for user agents, that is browsers, phone books and message editors. In the second layer, there are different elements such as WML, WML Script, image formats, card and calendar format, and so on.

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WAE provides an important service, that is the URL service. The URL identifies resources on a server that can be reached by well-known protocols. WAE also supports Uniform Resource Identifier (URI), which is used to locate resources that are accessed without using well-known protocols, such as wireless telephony functions.

2. Session Layer or Wireless Session Protocol (WSP)

Two interfaces for the WAE are provided by the wireless session layer.

(i) A connection-oriented service that functions on top of the transaction layer protocol.

A session is provided by the connection-oriented service between the WAP gateway and the client. It takes care of communication interruptions, like change of bearer and capability negotiation.

(ii) A service that is connectionless operates above a non-secure or secure datagram service. The WAE uses a thin layer when a reliable transaction of data is not required.

In short, a session layer provides the following services:

(i)) It creates and releases a connection between the client and the server.

(ii) Exchanging data between the client and the server using a coding scheme that is much more compact than the traditional HTML text.

(iii) Suspending and releasing sessions between the client and the server.

3. Transaction Layer or Wireless Transaction Protocol

A lightweight transaction-oriented protocol is provided by WTP which is appropriate for mobile phones and which also runs on top of a datagram service. A dependable way of communication is provided with an ability to avoid duplication and retransmit lost messages. WTP manages three types of transactions:

(i) **Unreliable one-way request:** A message is sent and no acknowledgement is expected from the receiving device. Such applications use the Wireless Datagram Protocol (WDP).

(ii) **Reliable one-way requests:** A message is sent and the recipient sends an acknowledgement.

(iii) **Reliable two-way request-reply transactions:** A message is sent and the recipient replies with exactly one result message. The sender then finally acknowledges the result message. If the recipient knows that the message processing time exceeds the initiator's timer interval, the recipient may send a 'hold on' message to prevent the initiator from resending the original message.

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4. Security Layer or Wireless Transport Layer Security (WTLS)

A transport layer security between the WAP gateway and the WAP client is provided by the security layer. Your data is protected by WTLS including privacy, denial-of-service protection, authentication and data integrity. Data integrity ensures that it is unmodified and uncorrupted. WAP privacy services guarantee that all transactions between the WAP device and the gateways are encrypted. Authentication and protection against denial-of-service attacks are also parts of WTLS.

5. Transport Layer or Wireless Datagram Protocol (WDP)

WDP provides an interface that is consistent to the stack's upper layer and the datagram layer forms the base of the WAP protocol stack. The WDP layer is not required if WAP is applied over a bearer supporting User Datagram Protocol (UDP). WDP also allows correction of data error. On GSM SMS and other bearers, provided by WDP provides the datagram functionality. If needed WDP can extend with the functionality for re-assembling and segmenting datagrams that are large for the underlying bearer.

6. Wireless Bearer Network

The wireless bearer networks are at WAP's lowest level. To function on various bearer services the WAP protocols are designed for them, such as packet-switched networks, short message services and circuit switched connections. Each network has its own advantage and disadvantage in terms of performances, delays and errors.

Check Your Progress

1. What is the main function of WAP?
2. When was WAP forum founded?
3. What is the main purpose of WAP?
4. List the three main components of a WAP model.
5. What is the use of WWW model?
6. What role does WAP gateway play when the browser sends request to the server?

12.3 WIRELESS TECHNOLOGIES

The wireless technologies could be said to be the worldwide standard which provides the Internet communications along with the advanced telephony services. The same is applicable on digital mobile phones, and many wireless appliances which make e-commerce easy and these are popularly known as the *WAP Forum.*

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WAP here is a short form of the **W**ireless **A**pplication **P**rotocol. One could define the **Wireless** as the lack of wire which pertain to the radio transmission. Here the word A**pplication** could be used for a computer program and a computer software which has been designed to do a particular task. The third word **Protocol** means the set of technical rules which talks of how the information could get transmitted and be received by using computers.

WAP can thus be said to be a set of rules which govern the transmission and reception of data which are related to the computer applications .The same is done via wireless devices which include mobile phones. WAP also helps the wireless devices to see the designed pages in a specific way from the Internet with the help of plain text .The same could look as simple as the black-and-white pictures.

WAP could be said to be a standardized technology which could be used for cross-platform and can also be used for the distributed computing which is like the Hypertext Markup Language (HTML) and Hypertext Transfer Protocol (HTTP) combination in internet. The only difference is that the wireless is optimized for low-display capability, a lesser memory and a low-bandwidth device like the personal digital assistants (PDAs), and some wireless phones. Thus it can be said that WAP is designed to be used on many a wireless networks which includes the GSM, IS-136, and PDC etc.

12.4 GENERATIONS IN WIRELESS COMMUNICATIONS

The mobile wireless technologies can be understood through about 4 or 5 generations. These generations deal with the discussion of the technological revolution and the evolution of the wireless technology. The generations have been named as 0G to 4G. Currently we are using the mobile wireless technology advancement of the 4G technology generation and soon coming up to the 5G technology.

0G: Wireless Technology

The first generation of the internet technology is the 0G which is often called the pre-cell phone mobile telephony technology. This includes the radio telephones which has been used in some cases in cars before the cell phones came into existence. It can be said that the Mobile radio telephone systems came before the mobile telephony technology. Thus these were the predecessors of the first generation of the wireless technology and were known as the 0G (zero generation) systems.

1G: Analog Cellular Networks

The main factor which was added to the First Generation mobile phones was the multiple cell sites. This generation of wireless technologies had the ability to transfer calls from one site to the other when the user travelled among the cells in a conversation. Here the first automated cellular network which was used

commercially and which was known as the 1G generation had been launched in Japan in the year 1979.

This generation of wireless had the capability to reduce transmission power which helped the new cells to be added. Thus this system had smaller cells but an enhanced capacity.

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2G: Digital Networks

This generation of wireless network came into play in the year 1990s.This was known as the 'second generation' (2G). The main factor which singled out this generation from the others was the use of the GSM standard. Thus the 2G phone systems used the digital transmission rather than the analog transmission. This also became an advanced and fast network for signalling.

3G: High speed IP Data Networks

The high use of mobile phones proved that people wanted to use the data services and thus internet was here to grow. Thus from the fixed broadband services to the mobile network, people started to look for greater data speeds. The main factor of differentiation in the technology was the use of packet switching rather than circuit switching when it came to the data transmission.



4G: Growth of Mobile Broadband

The 4th generation brought up the speed of transmission to 10-fold over the present 3G technologies. Thus there was an expansion of bandwidth and services in the 4G network. This lead to a high quality audio/video streaming in the end to end IP. Some of the technologies which were commercially available in 4G were WiMAX and LTE offered by TeliaSonera.

4G LTE data transfer speed could download at a speed of 100 Mbit/s, with a peak upload of 50 Mbit/s.

4 Cell Phone Generations Compared

	Standards	Technology	SMS	Voice Switching	Data Switching	Data Rates
1G	AMPS, TACS	Analog	No	Circuit	Circuit	N/A
2G	GSM, CDMA, EDGE, GPRS	Digital	Yes	Circuit	Circuit	236.8 kbps
3G	UTMS, CDMA2000, HSPDA, EVDO	Digital	Yes	Circuit	Packet	384 kbps
4G	LTE Advanced, IEEE 802.16 (WiMax)	Digital	Yes	Packet	Packet	up to 1 Gbps

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Check Your Progress

7. Name the generations in wireless communications.
8. Write a note on second generation (2G) wireless communication.
9. Name some of the technologies of 4G.

12.5 SECURITY ISSUES RELATED TO WIRELESS COMMUNICATIONS

Wireless security is the prevention of unauthorized access or damage to computers or data using wireless networks. Some of the common security options are the Wired Equivalent Privacy (WEP) and Wi-Fi Protected Access (WPA). The WEP is a standard but a weak security standard. It is also an old IEEE 802.11 which has been used since 1997. The latest security version is WPA which was launched in 2003. WPA is better than the previously used WEP. Also, there are Wireless Intrusion Prevention Systems (WIPS) or Wireless Intrusion Detection Systems (WIDS) which could be used to enforce wireless security policies.

A computer virus can be said to be a malicious program which self-replicates itself by copying itself to another program. Thus the computer virus will spread by itself and get into an executable code or documents. The main aim of this virus is to infect the vulnerable systems. The same could also be done to gain admin control and copy or steal some important sensitive data. Hackers aim to design computer virus with the malicious intent and look forward to the online users.

Virus could spread through emails and by opening the attachment which is present in the email, by visiting and already infected website, by clicking an executable file, and by infected advertisement which could help the virus spread to the system. The same could also happen by USB drives.

Internet sites are prone to internet frauds. These frauds have grown even faster than the Internet. Thus the chances of crime over the internet in case the buyers and sellers do not know each other are increasing.

E-commerce fraud came up with increasing websites. This is crucial for the cyber and click-and-mortar merchants. There are ample of e-mails and pop up ads which have helped the financial criminals to access personal account details of the customers. Also the phantom business opportunities and bogus investments are crucial frauds.

Security features like the authentication, escrow services and the non-repudiation could protect the company in e-commerce. It is assumed that the Websites of reputable companies will never lie. Thus an ad on the web or information on their website has to prove what they say and thus justify their own

corporate counsel, also the information goes through web approval committees along with many a regulating bodies which include the ones like FDA and the FTC.

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12.6 MOBILE COMPUTING IN FOUR DIMENSIONS

These added dimensions in a mobile computing system help to select the variables which could allow to divide the problems of mobile computing. These dimensions are the tools which could help to qualify the problem of building mobile software applications. These also relate to the mobile computing systems. The given dimensions of mobility could not be said to be absolutely orthogonal when seen with respect to each other. Thus one can distinguish among them as orthogonal variables. These dimensions are as follows:

1. Location awareness,
2. Network connectivity quality of service (QOS),
3. Limited device capabilities (particularly storage and CPU),
4. Limited power supply,
5. Support for a wide variety of user interfaces,
6. Platform proliferation, and
7. Active transactions.

These dimensions of mobility have to be catered in the whole process of design and implementation for the mobile application.

12.7 WIRELESS MILLENNIUM

The rise of wireless technologies are not just momentary, rather they are here to stay. It is clear that e-commerce is not just limited to the desktop. Today many a consumers are seen browsing on the net through the mobile. Thus here comes the role of internet and mobile phones.

Earlier, the use of Internet and mobile phone was different until the advent of WAP. The users could surf the Internet, but the same was limited to the desktop or the computer. The introduction of WAP enabled the users to access massive information, and data resources of the Internet through the help of mobile phone and other related communications device.

WAP was now open and secure, and could be used for the different applications. This could include the stock market information, the weather forecasts, enterprise data, and games. It has been seen that the WAP applications needs a few modifications to the existing web applications.

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Check Your Progress

10. List some of the common security options of wireless network.
11. What are security features that protect a company in ecommerce?
12. List the various dimensions of mobile computing.

12.8 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. WAP bridges the gap between the mobile world and the Internet as well as the corporate intranets and offers the ability to deliver an unlimited range of mobile value-added services to the subscribers—independent of their network, bearer and terminal. Mobile subscribers can access the same wealth of information from a pocket-sized device as they can from the desktop.
2. The WAP forum is an industry association founded in 1997 by Nokia, Motorola, Ericsson and Phone.com.
3. The purpose of WAP is to expand the usages of wireless data by providing a platform for developing new value-added services. WAP brings superior services and content to digital mobile phones and other mobile terminals from the Internet.
4. The three main WAP components that are necessary for the protocol to function properly are as follows:
   (a) WAP Gateway
   (b) WAP Server
   (c) Client Device
5. The WWW model is used on the Internet to provide the client with the ability to receive content in a defined data format from web servers. The standard protocols, like the Transmission Control Protocol and the Internet protocol (TCP/IP) and Hypertext Transfer Protocol (HTTP) handles the communication.
6. When the browser sends a request to the server, WAP gateway decodes it to plain text and sends the request to the WAP server as the desired content.
7. The mobile wireless technologies can be understood through about 4 or 5 generations. The generations have been named as 0G, 1G, 2G, 3G and 4G. Currently, we are using the mobile wireless technology advancement of the 4G technology generation and approaching towards the 5G technology.

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8. The second generation of wireless network came into play in the year 1990s. The main factor which singled out this generation from the others was the use of the GSM standard. Thus the 2G phone systems used the digital transmission rather than the analog transmission. This also became an advanced and fast network for signalling.
9. Some of the technologies which were commercially available in 4G were WiMAX and LTE offered by TeliaSonera.
10. Some of the common security options are the Wired Equivalent Privacy (WEP) and Wi-Fi Protected Access (WPA). The latest security version is WPA which was launched in 2003. WPA is better than the previously used WEP. Also, there are Wireless Intrusion Prevention Systems (WIPS) or Wireless Intrusion Detection Systems (WIDS) which could be used to enforce wireless security policies.
11. Security features like the authentication, escrow services and the non-repudiation could protect the company in e-commerce.
12. Various dimensions of mobile computing are as follows:
    (i) Local awareness,
    (ii) Network connectivity quality of service (QOS),
    (iii) Limited device capabilities (particularly storage and CPU),
    (iv) Limited power supply,
    (v) Support for a wide variety of user interfaces,
    (vi) Platform proliferation, and
    (vii) Active transactions

12.9 SUMMARY

- The WAP forum has developed an open global specification called the wireless application protocol (WAP). WAP allows the mobile user with a WAP device to access and communicate information and services easily and immediately.
- A set of communication protocols specified by WAP standardizes the manner in which radio transceivers, mobile phones and other wireless devices can be used to access the Internet, including e-mail, Internet Relay Chat (IRC) and the World Wide Web (www).
- WAP bridges the gap between the mobile world and the Internet as well as the corporate intranets and offers the ability to deliver an unlimited range of mobile value-added services to the subscribers—independent of their network, bearer and terminal.

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- A wireless network must have the following features: more latency, less bandwidth, less predictable availability and less connection stability.
- WAP is a set of protocols that specifies a complete framework for mobile Internet access. The WAP forum is an industry association founded in 1997 by Nokia, Motorola, Ericsson and Phone.com. The purpose of WAP is to expand the usages of wireless data by providing a platform for developing new value-added services.
- WAP has three main components that are necessary for the protocol to function properly, namely WAP Gateway, WAP Server, and Client Device.
- The WAP gateway provides communication between wireless networks and the Internet. It acts as an interface between telecommunication protocols within the mobile operator's network and Internet protocols.
- WAP server stores the WAP content. It contains Wireless Markup Language (WML), WML Script and Wireless Bitmaps which are all WAP content formats.
- The client device can be a mobile phone, a pager, a Personal Digital Assistant (PDA) or any other WAP enabled device.
- The WWW model is used on the Internet to provide the client with the ability to receive content in a defined data format from web servers. The standard protocols, like the Transmission Control Protocol and the Internet Protocol (TCP/IP) and Hypertext Transfer Protocol (HTTP) handles the communication.
- A browser in a WAP device communicates with the WAP gateway connected to the Internet. The WAP gateway translates requests from the www protocol to stack the WAP protocol and vice versa.
- The WAP client communicates with the WAP server by using the WAP gateway. The WAP gateway translates the client requests to www requests before submitting the request to the WAP server.
- The Open Systems Interconnection (OSI) model defines a layered framework for generically describing and designing protocols. Similarly, WAP has six layers. Each layer is responsible for managing some part of WAP.
- The six layers of a WAP are as follows:
    - Application Layer or Wireless Application Environment (WAE)
    - Session Layer or Wireless Session Protocol (WSP)
    - Transaction Layer or Wireless Transaction Protocol
    - Security Layer or Wireless Transport Layer Security (WTLS)
    - Transport Layer or Wireless Datagram Protocol (WDP)
    - Wireless Bearer Network

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- The wireless technologies could be said to be the worldwide standard which provides the Internet communications along with the advanced telephony services.
- Many wireless appliances which make e-commerce easy and these are popularly known as the *WAP Forum.*
- WAP could be said to be a standardized technology which could be used for cross-platform and can also be used for the distributed computing which is like the Hypertext Markup Language (HTML) and Hypertext Transfer Protocol (HTTP) combination in internet.
- The mobile wireless technologies can be understood through about 4 or 5 generations. The generations have been named as 0G to 4G. Currently we are using the mobile wireless technology advancement of the 4G technology generation and soon coming up to the 5G technology.
- Wireless security is the prevention of unauthorized access or damage to computers or data using wireless networks. Some of the common security options are the Wired Equivalent Privacy (WEP) and Wi-Fi Protected Access (WPA). The WEP is a standard but a weak security standard. It is also an old IEEE 802.11 which has been used since 1997.
- The latest security version is WPA which was launched in 2003. WPA is better than the previously used WEP. Also, there are Wireless Intrusion Prevention Systems (WIPS) or Wireless Intrusion Detection Systems (WIDS) which could be used to enforce wireless security policies.

12.10 KEY WORDS

- **Wireless Application Protocol (WAP):** It refers to the communication protocol that is used for wireless data access through most mobile wireless networks.
- **WAP Gateway:** It refers to a software system that helps WAP-enabled wireless devices to communicate to Internet websites and applications.
- **Wireless Technology:** It refers to the technology that provides the ability to communicate between two or more entities over distances without the use of wires or cables of any sort.
- **IP Network:** It refers to a communication network that uses Internet protocol (IP) to send and receive messages between one or more computers.
- **Wireless Security:** It refers to the prevention of unauthorized access or damage to computers or data using wireless networks.

12.11 SELF ASSESSMENT QUESTIONS AND EXERCISES

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Short-Answer Questions

1. What is WAP and why is it used for?
2. Mention the benefits of a WAP gateway.
3. How many layers are there in the WAP protocol stack? Name them.
4. What is the main factor that differentiates 3G technology from 2G technology?
5. Write a brief note on fourth generation wireless network.
6. What do you mean by mobile computing dimensions?

Long-Answer Questions

1. Discuss the three components of wireless application protocol.
2. Draw and explain the working of WAP model in detail.
3. Analyse the WAP architecture layers.
4. Describe the different generations of wireless communication.
5. Why is wireless security important? Discuss.

12.12 FURTHER READINGS

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UNIT 13 KNOWLEDGE MANAGEMENT

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Structure

13.0 INTRODUCTION

Knowledge management, as the name suggests, is the process of efficiently handling of information and resources within an organization. It could be said the process of creating, sharing, using and managing the knowledge of an organization. The same is a multidisciplinary approach when it comes to achieving organisational objectives where one could make a difference by using the best of knowledge.

Knowledge management (KM) stresses on the organisational objectives which include the improved performance, innovation, competitive edge in which the lessons learned are shared and integrated for a continuous improvement in the firm. There have been efforts which are in sync with the organisational learning and could differentiate the same by a greater focus when it comes to management of knowledge. This is by far a strategic asset and can be encouraged when it comes to sharing of knowledge. KM could be crucial for organizational learning.

In this unit, you will learn about the process of knowledge management and its goals. The unit will also explore the importance of collaborative computing and knowledge management in businesses, the features and tools of knowledge management. The unit goes on discussing the knowledge management strategies for different organizations and comprehending the knowledge creating process. In addition to this, you will also get to know the role of knowledge management in research and development organizations.

13.1 OBJECTIVES

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After going through this unit, you will be able to:

- Understand the concept of knowledge management and its goals
- Discuss how collaborative computing and knowledge management helping businesses
- Describe the tools and features of knowledge management
- Assess knowledge management strategies for different organizations
- Explain out the knowledge creating process
- Identify the role of knowledge management in research and development organizations

13.2 KNOWLEDGE MANAGEMENT AND ITS GOALS

KM initiatives are on an upswing as managers at all levels within all organizations face mounting pressure to work smarter and faster while wrestling with the demands of advanced technology and a shrinking work force. Practices of the bygone era are not applicable in the highly techno savvy environment and transient work force of today. KM techniques and technologies can help organizations to examine their processes and improve their services to customers. One of the biggest drivers of the KM movement is the issue of e-governance. Some countries and governments actually set deadlines for launching a host of on-line initiatives. One of the first states in India to come out with a comprehensive IT blueprint and a ten year plan to bring the benefits of e-governance and technology to the grassroots is Andhra Pradesh. The Indian government is also bringing about policy changes as well as simplifying procedures to shore up its intellectual capital as well as bringing the benefits of technology to the masses. One of the initiatives is the setting up of a consortium of IT companies that would be encouraged to establish 'Indian Institute of Global Services' specializing in Global Services for providing market intelligence on domestic and global services industry to disseminate information such as new trends, market conditions, key indicators, new opportunity areas, etc. The Institute will conduct research and suggest best practices, positioning of India as a global hub for IT enabled services, helping start-ups with marketing plans and contact databases, etc., design and facilitate courses for graduating and developing professionals for this sector.

The need of the hour, is to build knowledge bases that help government agencies and institutions, to get a better understanding of things such as, who are the recipients of those services, who are the providers, and where is the room for improvement and cost control. This would result in a significant investment in education driven by

a nationwide push among school systems to learn about best practices that can lead to improved test results. There is also interesting work being done with criminal investigation knowledge bases that allow law enforcement officials to conduct pattern analyses in high crime areas. This has been funneled by a worldwide realization by organizations on the tremendous need to consolidate their knowledge assets; how their internal operations work and how that dovetails with their constituent bases. Organizations are realizing that there is a tremendous amount of information that they have been storing. What they are struggling with is how they can put this data into context so that the same could be employed to bring about tangible benefits to the organization.

KM systems are also being extensively deployed by military establishments, primarily in the United States, to unearth knowledge from the extensive amounts of data available, both process oriented as well as situational.

Global Knowledge Economy

Various management experts have, for several years, highlighted the role of knowledge or IC (Intellectual Capital) in business and the need to leverage them to bring about tangible organizational benefits. The value of high-tech companies such as software and biotechnology companies lies not in physical assets that is measured by conventional accountancy techniques, but in their intangibles such as knowledge and patents. The last few years have witnessed a growing recognition by accounting bodies and international agencies that knowledge is a crucial factor of production. The current global economy has been described by most of the industry observes as a one in transition to a 'knowledge economy', or an 'information society.' But the rules and practices that determined success in the industrial economy of the 20th century need rewriting in an interconnected world where resources such as know-how are more critical than other economic resources. This section highlights the recent thought processes and the resulting developments while offering guidance on developing the appropriate organizational strategies to succeed in the new millennium. Current analysis suggests three major and interrelated driving forces that have resulted in the changing business rules and have been contributory to the increased competitiveness:

Globalization: Markets and products are more global in the current scenario. This is further complemented by increasing global sourcing of work. Thus many companies outsource manufacturing and software development to distant locations. India with its largest pool of scientific manpower, (as is very apparent), has been able to corner a majority of these outsourcing orders.

Information/knowledge intensity: Efficient production relies on information and know-how; over 70 per cent of workers in developed economies are information workers and more organizational workers employ their thinking mechanisms more than their hands.

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Internetworking and connectivity: Rapid developments in the field of Internet and allied technologies have resulted in the generation of a "global village" and the rapid shrinkage of distances between "global communities."

The net result is that goods and services can be developed, bought, sold, and in many cases even delivered over electronic networks. e-Business offers many advantages in terms of costs savings, efficiencies and market reach over traditional physical methods.

Characteristics of the Knowledge Economy

The knowledge economy differs from the traditional economy in several key respects:

1. The economics is not of scarcity, but rather of abundance. Unlike most resources that deplete when used, information and knowledge can be shared, and actually grow through application.
2. The effect of geographical displacement is diminished. Using appropriate technology and methods, virtual marketplaces and virtual organizations can be created, that offer benefits of speed and agility, round the clock operation and of global reach.
3. Laws, barriers and taxes are difficult to apply on solely a national basis. Knowledge and information 'leak' to where demand is highest and the barriers are lowest.
4. Knowledge enhanced products or services can command price premiums over comparable products with low embedded knowledge or knowledge intensity.
5. Pricing and value depends heavily on context. Thus the same information or knowledge can have vastly different value to different people at different times.

Knowledge, when formally captured into systems or processes has higher inherent value than when it can 'walk out of the door' in people's heads. Human capital or human competencies are a key component of value in a knowledge-based company, yet few companies report competency levels in annual reports. In contrast, downsizing is often seen as a positive 'cost cutting' measure. These characteristics, so different from those of the physical economy, require new thinking and approaches by policy makers, senior executives and knowledge workers alike. This requires leadership, positive risk-taking against the prevailing and slow changing attitudes and practices of existing institutions and business organization.

Policy Implications

The evolving knowledge economy has important implications for policy makers of local, regional and national government as well as international agencies and institutions. These include the following:

1. Traditional measures of economic success must be supplemented by new ones.

2. Economic development policy should focus not on creation of jobs, but rather on infrastructure for sustainable 'knowledge enhancement' that acts as a magnet for knowledge-based companies.
3. Development of policies for efficient regulation and taxation for information and knowledge trading at international level as well as looking to future knowledge-based industries rather than traditional industries.
4. Stimulation of market development through new forms of collaboration.

Business Implications

Most businesses enterprises are now realizing the role of knowledge and are creating KM programs and appointing Chief Knowledge Officers (CKO). However, care should be taken to ensure that such responses should be the part of a coordinated effort that includes the following:

1. Recognition of the importance of knowledge to the organizational business bottom line.
2. Design and develop new measures of enhancing corporate performance based on knowledge.
3. Systematically enhance learning and knowledge, through new organizational structure and processes that is in tune with the changing global environment.
4. Building a technology infrastructure to enhance knowledge creation and sharing.
5. To foster organizational wide dissemination of knowledge through effective Internet/Intranet backbone architecture settings and business practices.

What is Knowledge Management

Having discussed at considerable length, the evolution of computing and the popular quality and re-engineering methodologies and their relationship with KM, as well as its need and benefits, let us now try to define the term 'KM.'

Enterprises are realizing how important it is to "know what they know" and be able to make maximum use of the knowledge. This knowledge resides in different sources within an organization such as databases, knowledge bases, filing cabinets and its employees and is distributed right across the enterprise. All too often, one department within an organization repeats work of another department, because it is impossible to keep track of and make use of knowledge in other parts. Enterprises need to know the source and location of their intrinsic and extrinsic knowledge assets while ensuring their efficient management with a view of maximizing returns. Most traditional company policies focus on the tangible assets of the company and leave their important knowledge assets unmanaged. Success, in an increasingly competitive marketplace, depends critically on the quality of knowledge which organizations apply to their key business processes. For example, the supply chain depends on knowledge of diverse areas including raw materials, planning,

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manufacturing and distribution. Likewise, product development requires knowledge of consumer requirements, new science, new technology, marketing etc.

Knowledge assets refers to the knowledge regarding markets, products, technologies and organizations, that a business owns or needs to own and which enable its business processes to generate profits, add value, etc. KM, is not only about managing these knowledge assets, but also managing the processes that act upon the assets. These processes include: developing knowledge; preserving knowledge; using knowledge, and sharing knowledge. Therefore, KM involves the identification and analysis of available and required knowledge assets and knowledge asset related processes, and the subsequent planning and control of actions, to develop both the assets and the processes so as to fulfill organizational objectives and in the process bringing about tangible benefits.

Goals of KM

KM has multiple faces depending upon the various prevalent theories and disciplines as well as generous contributions from management, information technology, science, educational theory and communication practices and techniques. In general, there exists a synergy among these various disciplines and any single one cannot claim the ownership of knowledge management. Generally, KM initiatives within an organization have the following four basic objectives:

1. Effective harnessing or leveraging of the IC of an organization in the best possible fashion.
2. Promoting enhanced knowledge dissemination within the organization with the help of internal as well as external learning processes and systems.
3. Transforming individual knowledge into the structural capital of the enterprise.
4. Aligning business strategy with the existing core competencies of the organization and its capabilities.

Organizational Knowledge Management Approaches

The single question that emerges from the above discussion is regarding the approach that needs to be adopted by organizations in implementing a KM system. Most of the approaches undertaken by most organizations are generally linked to the strategies adapted to harness and leverage their intrinsic knowledge. These strategies are elaborated in the next section. The four commonly employed approaches to KM are:

Repository model approach: This is one of the most common approaches to KM employed by organizations. The key focus of this approach is on document management and the reuse of explicit forms of knowledge.

Communities of practice (COP) approach: This approach facilitates the transfer of knowledge by experts within affinity groups through dialogue and interpersonal discussions.

Continuous learning approach: This approach facilitates the application of the knowledge acquired by individuals in problem solving as well as enhanced decision making.

Business intelligence approach: This approach involves the creation of enterprise wide repositories and the extraction of valuable information and knowledge through the mining of these repositories.

Besides the above-mentioned approaches, the following could also be employed by organizations in their quest for leveraging their intellectual capital.

Innovation: This involves placing an emphasis on R&D, marketing and knowledge acquirement for new products and services.

Quality control: The goal is improvement of quality by means of quality control systems.

Strategic competency development: This includes the control and extension of the core competence, emphasis on key knowledge and competitive advantages.

Networking: The major objective is to foster knowledge sharing, through intensifying collaboration agreements and alliances between entities internal as well as external to an organization.

Knowledge technology: Emphasis on the transfer of knowledge, made explicit in knowledge systems.

Human resource management (HRM): Emphasis on self-governing teams, cooperation, motivation and stimulation of leadership to aid people within organizations adjust and to change.

Learning organization: This involves stimulation of organizational learning and management of change.

Information and communication technologies: Emphasis on the contribution of information and communication technology to the coordination, communication and sharing of knowledge.

Organizational: This approach places due emphasis on organizational development to implement KM.

Intellectual capital: This approach is characterized by placing emphasis on representing knowledge for the benefit of valuation

Customer focus: The organizational focus is on developing products and services tailored to meet customer requirements.

Irrespective of the approach undertaken by an organization in order to develop and deploy KM systems, the following core issues need to be taken into account:

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Management Structures

KM structures tend to possess a decentralized management responsibility along with a shared infrastructure that is necessary to support it. The infrastructure includes a knowledge visionary who helps to develop the shared vision, coordinates activities and encourages KM efforts in conjunction with an organizational information technology platform and corporate storage repositories such as databases and libraries. The organizational structure and infrastructure is generally not restricted to a central corporate office or function.

Funding

Organizational KM funding tends to mirror the pattern of responsibility mentioned above. While some resources are often centrally dedicated to support KM efforts, funding for specific projects and approaches usually comes from IS departments and the business units themselves.

Organizational Culture and Enablers

Senior management support is crucial to success of any KM initiative along with several other important factors like strong leadership and active promotion of successes in addition to providing the necessary tools for people to find the information and knowledge they need. The cultural issues and enablers chiefly revolve around support and collaboration. Most organizations begin by inducing a culture supportive of KM, such as a strong professional ethic and pride supported by well-honed skills in teaming, including cross-functional teams, besides factors such as senior management support that have improved as a result of early successes and sharing cultures. This is supplemented in some organizations, by providing formal financial rewards to encourage behavior conducive to KM activities. These include incentives for knowledge development and transfer in spheres related to an employee’s core competencies.

Technology Infrastructure

Technology forms one of the key enablers for the implementation of KM services and applications. Many of the commonly available approaches to KM would be rendered ineffective in the absence of technology. Significant funding is being spent on IT support systems and the technologies having the most dramatic impact on knowledge sharing are:

- Groupware
- Collaborative Applications
- Data Warehousing and Mining Tools
- Cataloging and Indexing Applications

KM does not mean IT and vice-versa. The role of IT in KM is that of a facilitator or an integrator of communications technology. The critical role for IT is

due to its ability to support communication and collaboration. The critical issues include the need to adopt common, user-friendly platforms. The explosive growths of Internet and Intranet technologies has also acted as a catalyst to KM initiatives and are especially successful at supporting approaches wherein individuals can find each other and the knowledge they require.

Check Your Progress

1. Name the three major driving forces that have been contributing to the increased business competitiveness.
2. Define knowledge assets.
3. Mention the processes which are being managed by KM.
4. What are the four commonly employed approaches to KM? Name them.

13.3 COLLABORATIVE COMPUTING AND KNOWLEDGE MANAGEMENT

Collaborative computing could be seen to be a diverse collection of information technologies. The same has been designed to support work among individuals. It is true that organizations which make use of the collaborative computing technologies will improve workforce productivity. They will also enhance the creativity of an individual worker. This is because they will have an access to each other's information whenever they need it for work.

Collaborative computing came from the early generations of the stand-alone applications. These applications were instant messaging and video conferencing. The aim of these applications was to bridge the gap which geographic distances had made among individuals who could not work together. Thus these technologies became a way to replace face-to-face interactions .At the same time were delivering the value which came to practice when individuals physically came together to collaborate.

Thus the collaborative computing is not only bridging the gap of geographical distances and making individuals to work together but is also helping the individuals to improve the working experience.

The coming of a collaborative computing and the acceptance of most of the innovations started rapidly enhancing with the collaboration and cooperation in organisations. The same has been seen in the 19th century. Also it was this partnership among science and industry which helped the scientists to give in practical, reproducible technologies that can be reasonably afforded. It is due to this new collaboration, that innovation grew quickly.

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Also because of the partnership, science and businesses have been separate entities. Researchers have been working independently and also as members of companies who specialize in developing, manufacturing and marketing innovations in this period. Collaborative computing has helped in the same.

Companies especially communications have already started making and maintaining their in-house research and development divisions. This trend started in 20th century. Also in this process the same is improved and marketed in the innovations of many a companies. This also helped in getting rid of the barrier among the companies.

13.4 KNOWLEDGE MANAGEMENT TOOLS AND ITS FEATURES

A Knowledge Management System [KMS] can be described as, *"A system for managing, organizing, filtering, analyzing, and disseminating knowledge in all of its forms within an organization."* It supports organizational functions while addressing the needs of the individual within a purposeful context (departments or divisions). Accordingly, KMS software can be classified into the five KM categories (Figure 13.1) as listed below:

1. Knowledge gathering
2. Knowledge storage
3. Knowledge communication
4. Knowledge dissemination
5. Knowledge synthesis

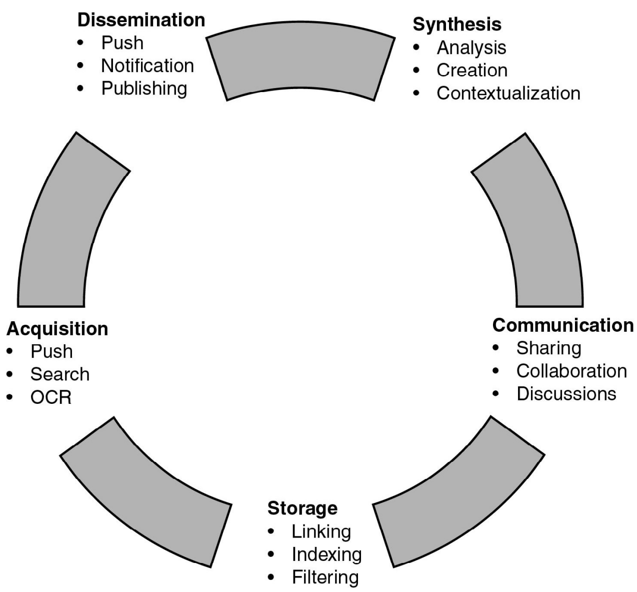


Fig. 13.1 *Key Knowledge Management Processes*

KM Software can be grouped into five common categories that represent the current software market:

1. Document management
2. Information management
3. Searching & indexing
4. Communications & collaboration
5. Expert systems

A sixth category comprising of systems for managing intellectual property can be added to the above list. Although they aren't specifically KM tools, they help codify the intellectual assets of an organization and are certainly part of the KM domain. Geographic Information Systems (GIS) as well as visualization techniques can also be effectively deployed in the development of a KMS. For example, GIS could be employed for indexing purposes within an organization.

The key organizational knowledge processes described in the previous chapter are based on my experiences, insights and research in this field. Some of the techniques presented in the subsequent sections may be employed in more than one process, which should not be a cause of confusion to the reader. The perceived overlap is intentional and the objective is to present the core processes and the subtle differences between them.

Organizational Knowledge Creation

Organizational knowledge is created through the personal as well as collective knowledge creation cycles, as described in the preceding chapter. The knowledge so created is fed into the organizational knowledge base, a structured storage base, wherein the knowledge is further refined and subsequently supplied to the organizational knowledge workers for personal consumption as well as actionable outputs. During this flow, the knowledge is enriched by the addition of the personal knowledge of every individual (tacit knowledge) including their insights, judgements, experiences, the collective knowledge of the departments, divisions as well as project teams, and finally flows back to the knowledge base. New knowledge so acquired is appended to the organizational knowledge base and obsolete knowledge is deleted. The process mentioned above is cyclic and self sustaining and is explained in detail in the following sections.

In order to locate and access information that is appropriate for an organization, one needs to understand how information and new knowledge are created, organized, and stored using the currently available technologies. Individuals as well as organizations often take information for granted, unaware of the complex process that takes place before new knowledge is produced. It is a commonly accepted fact that ideas form the basis for research. Ideas that are meticulously researched and developed and can eventually lead to new knowledge. However, the complex process of developing a new idea into new knowledge can take a

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long time while costing a great deal. Scientific research is usually the most costly, but research in the humanities and social sciences also costs money. Researchers spend a lot of time writing and submitting grants to various organizations, agencies, and others to try and secure funding for their research projects.

However, the conversion of ideas into commercial revenue streams is the essence of innovation. Idea creation is simply the starting point. In an organization, the percentage of those people whose ideas are implemented, are measured by the innovation quotient, is very low as compared to the percentage of employees with good ideas, measured by the idea quotient. Innovation provides organizations with a definite competitive advantage. Stated in other words "the secret to competitive advantage is innovation." Innovation can help businesses meet all of their strategic challenges, not just competition; for example, in confronting accelerating rates of change, globalization, rapidly advancing technology, a more diverse work force, and a change from an industrial to a knowledge-based economy. Meeting all of these challenges helps the firm achieve competitiveness, and meeting these challenges appropriately depends on innovation. The major issues faced by organizations in this respect are:

- Sharing individual ideas that eventually become a part of the organization knowledge base.
- Nurturing relevant ideas and shaping them into projects and prototypes.
- Encapsulating the resulting knowledge into products and processes and the organization's IC.

This can be achieved by considering the innovation process in terms of flows of knowledge and its conversion between tacit and explicit — flows between people, codification into designs and databases, combination and restructuring of knowledge into new forms. However, it has to be noted that the process is non-linear as well as non-sequential. It depends on knowledge flows across various organizational and discipline boundaries and extensive informal networking by the organizational knowledge workers, including customers and business partners.

In the subsequent section, we shall explore the three commonly employed knowledge creation techniques, employed by organizations to harness their IC.

Knowledge Networks

There is no doubt regarding the fact that better management of knowledge within the organization will lead to improved innovation and competitive advantage; The goal being the better utilization of internal and external knowledge. However, the approach to be adopted by organizations to achieve the above mentioned goal is debatable and varied among the proponents in the field of knowledge management. The views presented in this text reflect the commonly accepted norms in this field and also reflect my experience in the subject. With time, further advancements in technology, increased research coupled with the development of key standards, further more effective approaches may emerge. The peculiarity and the uniqueness

of the Indian culture and its corporate functioning have also been taken into account in the process of authoring this text.

Numerous vendors and consultants propound a technology driven approach to KM implementations within organizations. As mentioned earlier, this view is in tune with the "off-the-shelf" approach adopted by software vendors. On the other hand, there is another commonly held view that an organizational learning culture coupled with an opulent reward structure would automatically drive knowledge creation and sharing within an organization.

However, the effective utilization of knowledge and learning requires both culture and technology. A successful organizational KM implementation entails the creation of an organizational learning and sharing culture coupled with the deployment of technology as an enabler. Explicit information and data can be easily codified, written down, and stored in a data base. Any organization worth its name would have the requisite skills and tools to handle this form of business information. However, an important point to be noted is that, simple data is frequently not where competitive advantage is found. An organization's real edge in the marketplace is often found in complex, context-sensitive knowledge, which is difficult, if not often impossible, to codify and store in a typical binary form. This core knowledge is found in individuals, communities of interest and their connections. An organization's data is found in its computer systems, but a company's intelligence is found in its associated biological and social systems. Computer networks must support the people networks in the emerging fluid and adaptive organizations of today. The reverse is however not possible.

Implementation methodology A typical organizational hierarchy along with the associated charts and reporting structures are effective for control and planning. This comprised of sufficient knowledge in a time when organizations faced gradual change. The current fluid business environment does not allow only static structures and does not reward those that follow prescribed configurations in the face of rapid change. The fast economy requires flexible, adaptive structures that self-organize internally in response to changes externally. The current knowledge-critical economy necessitates the creation of charts to depict members with base operational knowledge, or primary members within an organization, as well as members with knowledge to complement these primary members, or in other words the secondary members. In addition to typical organizational hierarchy charts, visualizations of the massive interconnectivity that occurs in the learning systems within the organizations are required. The formation of such multi-tier structures is required to build and sustain effective learning systems within an organization that form the key to a successful development of an effective organizational KMS.

Knowledge is the capacity of people and communities, continuously generated and renewed in their conversation, to meet new challenges and opportunities. People responsible for knowledge value creation can be inspired and supported, but they cannot be "managed" as people were managed in the

industrial era, as mere extensions of the machinery. Organizations need to shift the focus of their knowledge initiatives to developing an open culture of communication and collaboration that is supportive to the sharing of innovative work and business practices.

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The knowledge networks discussed above, is a subset of an organizational ecosystem or a network of conversations, face-to-face and electronic meetings, facilitated for results, richly hyperlinked with, feeding, and fed by knowledge repositories of what, who, why, how, where, and when. Communities of practice co-evolve with their shared body of knowledge, and the protocols and tools for upgrading it. The dynamic force of this co-evolution is the network of conversations, in which, critical perspectives, new needs, circumstances, and better solutions to meet them are introduced.

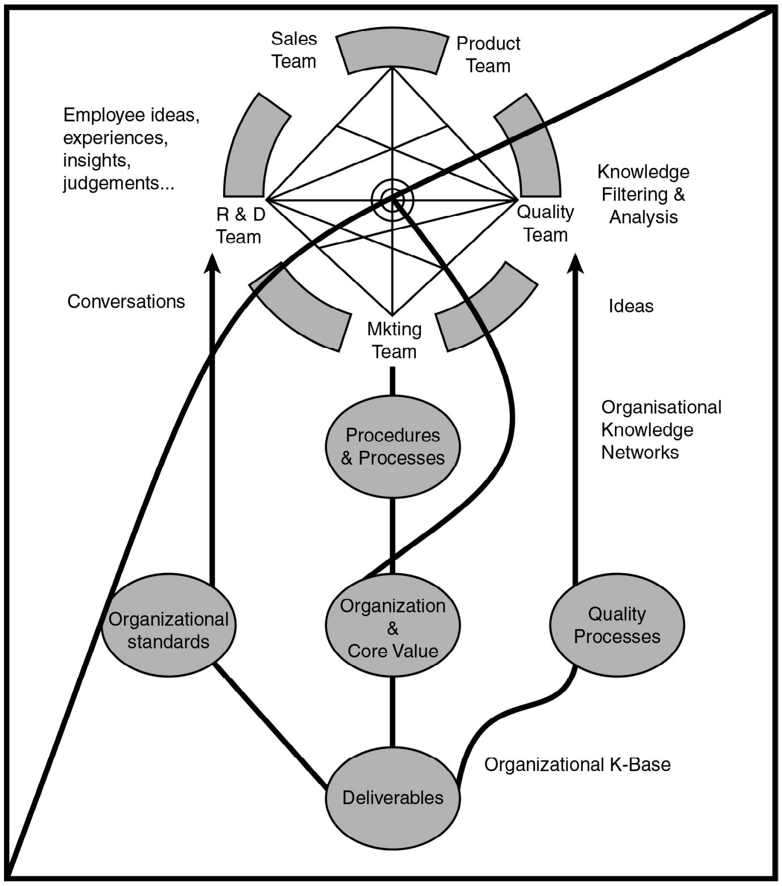


***Fig. 13.2** Organizational Knowledge Networks*

Organizational knowledge ecosystem A knowledge ecosystem can be constructed as a tri-layered network comprising of the following:

(a) People network

(b) Knowledge network

(c) Technology network

As listed above, this includes a network of people with productive conversations facilitated for continuously creating a knowledge network of ideas, information and inspiration, that cross-fertilize and feed on each other, supported by a technology network of knowledge bases, communication links, action scripts, sense-making and negotiation tools, that generates business and social value through the action of its members augmented by the intelligence of the whole ecosystem. A knowledge ecosystem can be construed as a complex adaptive system of people in communities co-located in the same space, physical and/or virtual, in which they cultivate relationships, tools, and practices for creating, integrating, sharing, and using knowledge.

Knowledge ecology is an interdisciplinary field of management practice, emerging from the confluence of management strategy, communities of practice, adaptive systems and knowledge management. It is a growing body of knowledge and practices focused on continuously improving the relationships, tools and methods for creating, integrating, sharing, using, and leveraging knowledge.

Organizational network analysis: Organizational Network Analysis [ONA] is a software supported methodology, that reveals the inner workings of an organization. It uses the rigor of systems analysis to reveal the behavior inside and between organizations. Knowledge networks are mapped that uncover interactions within and across the boundaries of the organization. These visualizations are in effect similar to a medical x-ray and reveal the true internal functioning, learning and adaptation within an organization. Without these visualizations, core activities are hidden, or not normally visible on the surface. ONA exhibits both how knowledge is shared in emergent communities of practice, and how it is utilized in key business processes. In short, it uncovers the hidden dynamics that support learning and adaptation in the modern organization.

The management within an organization can now visualize the connections that matter and can further also measure and benchmark them. Based on recent research, an organization can now be benchmarked in key dynamics such as adaptability to external environment, learning capacity, openness to the environment, ability to span boundaries, brittleness of its structures, probability of project success, and efficiency of information flow. This technology provides the ability to drill down into a complex organizational system and find emergent subject matter experts, natural leaders, bottlenecks, breakdowns in communication and communities of practice. The organization can be viewed and measured from the system per se, to the group level, and down to the individual as well as their interrelationships.

ONA is an outgrowth of many knowledge disciplines including social network theory, organizational behavior, interpersonal communications, chaos theory, complex adaptive systems, artificial intelligence-based search and pattern-matching, communities of practice research and a branch of mathematics called

Graph Theory. ONA is basically an Object-Oriented (O-O) model of an organization, with objects such as people, teams, and technologies interlinked, sending messages to each other and invoking their respective methods to accomplish the goals of the firm.

Tools

NETWRK 4.2: It is a new and improved package to analyze a network at several hierarchical levels. The bilateral relationships between any two system components via all pathways are quantified. A description of how much each population feeds at the various levels is provided, and the complex web of relationships is mapped into an equivalent chain, useful for evaluating the efficiencies of the overall system at each level. Thirdly, a number of information specific indices that can be used to describe the organizational status health or integrity of the network as a whole can be calculated. Finally, all the pathways for recycle within the system are listed, and the system network is decomposed into two webs — one that consists entirely of recycled flow, and the other an acyclic mesh comprising of dissipative information.

InFlow 3.0 - Network Mapping Software: InFlow is designed for consultants, by consultants. Inflow has been used to map and measure organizational networks since 1988. InFlow has been successfully applied in the following projects:

- Knowledge management
- Post-merger integration
- Organization design
- Workforce diversity
- Team building
- Internetwork design
- Network vulnerability assessment
- Industry ecosystem mapping
- Diffusion of innovation
- Community development
- Building productive networks

The version 3.0 provides new metrics, new network layouts, new what-if analysis, and is designed to work with Microsoft Office and the internet.

Organizational Knowledge Mapping Techniques

Knowledge mapping represents the ongoing quest within an organization (including its supply and customer chain) to help discover the location, ownership, value and use of knowledge artifacts, to learn the roles and expertise of people, to identify constraints to the flow of knowledge, and to highlight opportunities to leverage existing knowledge. Knowledge mapping is an important practice consisting of survey, audit, and synthesis. It aims to track the acquisition and loss of information

and knowledge. It explores personal and group competencies and proficiencies. It illustrates or "maps" how knowledge flows throughout an organization. Knowledge mapping helps an organization to appreciate how the loss of staff influences IC, to assist with the selection of teams, and to match technology to knowledge needs and processes.

It is a commonly known fact that, knowledge is sought primarily within the context of a problem and is to be applied rather than purely contemplated. Problems also commonly referred to as issues or opportunities; tend to be the primary drivers for the acquisition of knowledge. The nature of the problems being encountered by organizations across the globe is highly varied and complex and very different from the well defined problems of yesteryears. With the advent of issues relating to the environment and culture outside an organization, significant problems are transdisciplinary and cannot be effectively dealt with the existing systems. Solutions to these classes of problems will determine long-term sustainability of an organization. Hence, developing reliable means of coping with them is critical. The shift to knowledge based economies and cultures necessitate major structural changes to the current economy and social institutions. The management of complex transdisciplinary problems necessitates a mapping to an organizational knowledge base. As mentioned earlier, the ability to synthesize and apply essential knowledge is possible through subject matter experts in each discipline. In order to reach this point, experts have to practice in a field for a long period of time. Experience, eventually erodes the inconsequential and leaves the essential framework or knowledge map. Experts report that the ability to handle knowledge increases significantly once this plateau of essential knowledge is reached. However, the means by which the expert draws conclusions is not explicit and universally accessible. Knowledge mapping therefore represents an opportunity not only to solve complex problems, but also to democratize the understanding of transdisciplinary processes. The following are some of the major challenges faced by organizations in their quest for an effective KMS.

Core Implementation Issues

1. An escalating rate in the growth and diversity of knowledge and information available to and within an organization.
2. The fractionation of the disciplines into narrow specialty fields, thereby augmenting a trend towards depth rather than breadth.
3. An increase in professional mobility, leading to a discontinuity of focus and experience within an individual's career (the saying "jack of all trades, master of none" is very valid in the current recessionary markets), and ultimately fewer real subject matter experts.
4. The lack of any formal framework which explicitly represents the collective knowledge base and problem solving processes, in order to enable meaningful dialogue and action, irrespective of expertise.

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Knowledge maps An organizational knowledge map is a navigational aid to explicit (codified) information and tacit knowledge, highlighting the importance and the relationships between knowledge stores and dynamics. The organizational knowledge map is an outcome of synthesis within the organization and portrays the sources, flows, constraints and sinks (losses or stopping points) of knowledge within an organization. An organizational knowledge map highlights the following:

1. Location, ownership, validity, timeliness, domain, sensitivity, access rights, storage medium, use statistics, medium and channels of common organizational data, information and knowledge pools or sources.
2. Organizational documents, files, systems, policies, directories, competencies, relationships, authorities
3. Boundary objects, knowledge artifacts, stories, heuristics, patterns, events, practices, activities
4. Explicit and tacit knowledge which is closely linked to strategic drivers, core competencies and market intelligence.

Organizational newsfeeds, contact addresses, network transactions, helpdesks, patent information, Human Resource Department (HRD) databases, customer complaints, WAN/LAN directory structures, library, record archives, process descriptions, push profiles, metadata directory, organizational best practices, and competitor information form the primary sources for the construction of knowledge maps.

Organizational benefits

1. Encourage reuse of organizational knowledge and prevent re-invention, saving search time and acquisition costs.
2. Highlight islands of expertise and suggest ways to build bridges to increase knowledge sharing.
3. Discover effective and emergent communities of practice where learning is happening.
4. Provide a baseline for measuring progress.
5. Reduce the burden on experts by helping staff to find critical information quickly.
6. Improve customer response, decision making and problem solving by providing access to applicable information.
7. Highlight opportunities for learning and leverage of knowledge.
8. Provide an inventory and evaluation of intellectual and intangible assets.
9. Research for designing a knowledge architecture or a corporate memory.

Implementation methodology Knowledge mapping is a technique that is dependent on the understanding of the organizational knowledge structures and

the mediums of representations appropriate to these structures. The given media will control the types and forms of representation possible to employ. Implicitly, the mapping starts from the idea of having access to shared symbolic structures for the communication of knowledge. Knowledge maps and mapping are not explicitly directed at making new languages but for supporting a wide range of existing representational strategies appropriate to knowledge representation suited to cater to the organizational requirements. This means that there must be some agreement on the shared languages and mediums necessary to start mapping and to create maps. There has to be some initial agreement by users of the technique on the notational and organizational structure to be used. The technique is heavily dependent on the desire to make knowledge explicit and accessible and an ongoing commitment to the process of material knowledge formulation. It is further dependent on the need for a shared network of developers and users that would critically and constructively interact in advancing the technique. There is a large burden (time, resources, etc.) placed on the mapmaker to initiate dialogue with others, describe, document and represent the constructs in explicit ways. There are numerous techniques that can be effectively used to map organizational knowledge. However, these techniques effectively map only around fifty percent of the knowledge necessary to really capture key processes and allow individuals to replicate or negotiate a given example.

Example: The process of filling up a manpower recruitment form in an organization will add some experimental dimensions (tips and tricks) but will be meaningless unless the process is actually executed.

If the technique were used to describe all the constructs and relationship in, for example, cricket game or a soccer match you would not have the beauty or excitement experienced in a real game.

However, these approaches may not be able to communicate the alternative paths of action if required; for example, the additional information to be furnished or additional columns to be filled in case the manpower requirements are not regular budgeted positions. These techniques may not be significant in understanding the strengths and weaknesses of conventional approaches but contribute significantly in bridging the gap between the conceptual and the contextual design elements.

Knowledge map construction: The development of an organizational knowledge map begins with the development of a conceptual framework in conjunction with a working dictionary of the major organizational structure being considered. These structures can be construed as 'spaces,' wherein, the knowledge map is organized and formalized. A general organizational map is constructed of four interconnected representational 'spaces' as mentioned below:

Dialogue space: The dialogue space represents an area for free exploration, notation and diagramming that helps the organizational knowledge mapper to question and clarify intents, identify justifications, categorize the key constructs

and explore the possible relationship between constructs. This space is analogous to whiteboards, brain storming sessions or similar techniques employed for effective problem solving.

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Construct-Relation space: This space represents the area where each of the constructs developed in the dialogue space is formally defined, described and whose key characteristics are listed based on the described relationship. This includes information about the author of a construct (references, pedigree, date, etc.), its inheritance (level of dependence), what other constructs and relationships it is dependent on or what other constructs are defined or organized by it. It is a complete record of the definitions of the domains, constructs and relationships and the symbols (legends) used to represent them.

Operational space: The place where the constructs defined above are represented, located, combined, classified, categorized and interrelated resulting in the generation of further structures and emerging domains (combinations of key constructs and relationships). It is where the operational evaluation of the approach to the solution is carried out to observe whether the stated intents are achieved. It is the space that shows the evolving map of the overall organization.

Interpretive space: The additional knowledge that may be required by a user to understand the map created in the operational space is introduced or additional references are provided through the interpretive space. It is the space, where one creates the navigational constructs and relations necessary to guide the user through specific pathways in the process of solving a problem. It is where one can explain how the effects of different judgments, values, constraints and priorities influence bias or limit navigation through the association space.

Knowledge map creation—an example

1. The mapping process starts by identifying critical constructs and relationships central to the intent. This is achieved by organizing initial thoughts in the 'Dialogue Space' by expressing intent, arguments, questions, diagrams, pictures, etc., to clarify the intent.

   If the intent was to clarify certain KM concepts, an individual would begin by trying to locate the organizational Subject Matter Expert (SME) in the field of KM. Once this has been achieved, this would be followed by means to contact the concerned person. This involves two constructs and one relationship map. The various possibilities (in this case, the various persons with the requisite knowledge), their location and the means to contact them would be entered into the dialogue space.

2. The key characteristics of the construct would then be defined in the construct-relation space. They are as follows:
   (i) Construct 1 — Starting location (Division / Department, Mail ID, owner of the construct, etc.)

(ii) Construct 2 — Location of the organizational subject matter expert (SME), (Division/Department, Mail ID, Name of the subject matter expert.)

(iii) The descriptions which include the label and form of symbolic representation used to express the constructs, i.e., starting location and location of the SME, each described by a circle.

(iv) The next step involves the definition of the relationship between the constructs. This is conceived by finding out the relationship between the constructs. In the example mentioned above, the two constructs are related by the sharing of the relevant information (regarding knowledge management). The definition of the relationship also includes characteristics such as the method (E-mail, phone call..,) of contacting the source, the parameters (E-mail ID, phone number…) and ends with a label.

(v) Definitions of the constructs and relations are kept in the construct-relation space so that one could easily locate the descriptions and processes employed and the symbols used to represent them. The ability to independently inspect the descriptions of the constructs, relations and symbols becomes important as complexity of organization is increased.

(vi) The symbols defined in the preceding step (circle, lines, picture, etc.) are placed in relation to each other. The user has access to all the spaces within the map or inherits a copy of the map. Additional assistance would have to be provided to interpret the map. This information could be made a part of an area termed as interpretive space. Here the intent, the entry level of knowledge and the best way to navigate the knowledge could be included.

(vii) The interpretive space should also allow the user to 'deposit' questions or notes about the impediments or insights that she considers relevant to understanding the map. This questioning allows feedback to the map makers. It helps to indicate, what in this case might be, a strategy for a better map that meets the same intent. It is more explicit about the knowledge and could be used by people who do not have any working knowledge of the intent.

The user may alter any of the spaces to reflect a more useful dialogue, constructs, relationships, associations and interpretations. This type of feedback demonstrates that an important issue is not only the user's inheritance of the map but also the mapmaker's inheritance of the user's map (questions and changes). It is always important to remember that the purpose of mapping is to share and develop better knowledge within a given intent and context. In order to make the maps usable, formalisms need to be imposed in the basic approach. The technique relies initially on the notation and organization of the spaces, that have been imposed

to help foster explicitness and allow for interpretation and controlled interaction. It is up to each user to determine the most useful and usable strategy for making and interpreting the map. The structures proposed are necessary to support a robust environment for knowledge development and transfer.

Knowledge mapping tools: VISUAL CONCEPT is a "visual thinking software"; providing a medium for all kinds of creative and systems thinking. It enables ideas to be developed as a basis of planning, designing, authoring, organizing, relating, mapping, scenario building and countless other activities. It enables one to easily structure ideas and print them out, communicate them, transfer them and relate them to other visual maps with links to ideas expressed in any Windows environment. It also helps one capture large amounts of information and creates knowledge maps either as ideas occur or as they are extracted from audits, meetings, lectures or texts. The software acts as an outliner to automatically develop clearly structured stories, essays and reports. By mapping interrelationships, one can greatly increase the organizational capacity to understand complex issues. On a corporate network, Visual Concept comes to the fore as a medium for sharing and developing ideas. 'Ideas Pools' and other knowledge sharing files become the arena for ideas exchange with links to source material in other Windows-base applications or on the internet. The following are some of the key advantages of this software:

1. The software greatly enhances the structuring of thoughts to write essays, to make speeches or write articles, for prioritizing, for planning simple or complex tasks, for thinking through fuzzy issues, for communicating thinking to others.
2. Visual Concept is particularly valuable as a medium for involving others in sharing information and for thinking together.
3. Visual Concept helps access the full power of an individual's mind, provoking the kind of thinking that is needed at a given time. It provides a way of making thinking visible, utilizing a workstation's power to map, model and structure thought processes making it possible to develop and explore one's intrinsic environment and its relationship to others, thereby helping one develop systemic and holistic thinking.
4. Visual Concept can be used to access knowledge repositories and to enhance organizational thinking. It has applications at the personal level as a study tool, as a planning medium and to help in exploring and expressing ideas of all kinds. For groups and teams, it is particularly valuable for helping share thought processes, aligning energies and giving shared ownership of resulting plans. At the organizational level, it is invaluable for strategic thinking and as a means of developing and accessing corporate knowledge

Concept mapping: Concept maps are tools for organizing and representing knowledge. The fundamental idea as promulgated by David Ausubel — an expert

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on learning psychology is that, learning takes place by the assimilation of new concepts and propositions into existing concept propositional frameworks held by the learner. The basic idea is similar to that of a knowledge map. They include concepts — usually enclosed in circles or boxes of some type — and relationships between concepts or propositions, indicated by a connecting line between two concepts. Words on the line specify the relationship between the two concepts.

Key concepts: A concept can be perceived as a regularity in events or objects, or records of events or objects, designated by a label. The label for most concepts is a word, although sometimes symbols such as + or % are employed. Propositions are statements about some object or event in the environment being considered, either naturally occurring or constructed. Propositions contain two or more concepts connected with other words to form a meaningful statement. Sometimes these are called semantic units, or units of meaning.

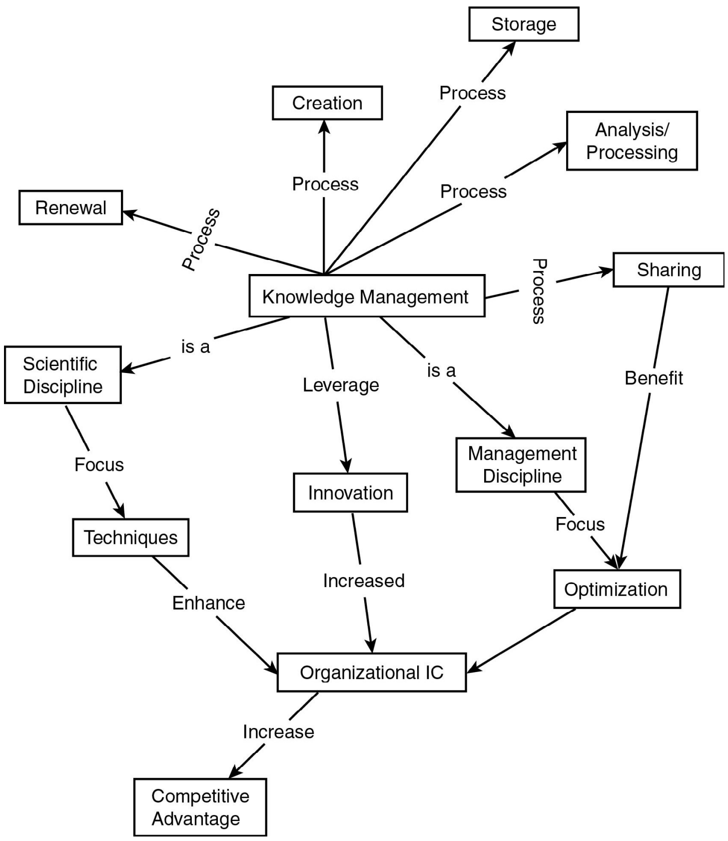


Fig. 13.3 *Structure of a Concept Map*

The above figure illustrates an example of a concept map that describes its structure as well as the characteristics as described in the preceding section. The entire process and the steps involved in the construction of the map depicted above are beyond the scope of this text and has not been depicted.

Representation: Concepts are represented in a hierarchical fashion with the most inclusive, most general concepts at the top of the map and the more

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specific, less general concepts arranged hierarchically below. The hierarchical structure for a particular domain of knowledge also depends on the context in which that knowledge is being applied or considered. Therefore, it is best to construct concept maps with reference to some particular question, situation or event that represents the need to organize knowledge in the form of a concept map. The relationships (propositions) between concepts in different domains of the concept map are represented using cross links. Cross-links help one to easily visualize how certain domains of knowledge represented on the map are related to each other. In general, cross-links often represent creative leaps on the part of the knowledge mapper, especially when new knowledge is being mapped. The three important features of a concept map that facilitates creative thinking are:

1. The hierarchical structure
2. The ability to search for and characterize cross-links
3. Specific examples of events or objects that help to clarify the meaning of a given concept.

Construction: The extensive process of knowledge creation is beyond the scope and the purpose of this book. However, the general steps involved in the construction of maps are outlined. This should, however, not generate a simplistic view of the entire process in the minds of the reader.

1. In learning to construct a concept map, it is important to begin with a domain of knowledge that is very familiar to the person constructing the map. Since concept map structures are dependent on the context in which they will be used, it is best to identify a segment of a text from a manual, an organizational procedural activity, or a particular problem or question that one is trying to understand. This creates a context that will help to determine the hierarchical structure of the concept map. It is also helpful to select a limited domain of knowledge for the first concept maps.
2. Once a domain has been selected, the next step is to identify the key concepts that apply to this domain.
3. These are to be listed, and then from this list a rank order should be established from the most general, most inclusive concept for this particular problem or situation, to the most specific, least general concept. Although this rank order may be only approximate, it helps to begin the process of map construction.
4. The next step is to construct a preliminary concept map. This can be done by writing all the concepts on Post-its, or preferably by a software program. Post-its allow a group to work on a whiteboard and to move concepts around easily. Application packages are effective and facilitate moving of concepts together with linking statements and also the moving of groups of concepts and links to restructure the map.

The figure 13.3 illustrates a concept map that addresses the question, "What is KM." The output depicted here represents only one of the various possibilities that may exist. It is important to recognize that a concept map is never finished. After a preliminary map is constructed, it is always necessary to revise this map. Good maps usually undergo three to many revisions. This is one reason why a computer software program is helpful. After a preliminary map is constructed, cross-links should be sought. These are links between different domains of knowledge on the map that help to illustrate how these domains are related to one another. Finally, the map should be revised, concepts positioned in ways that lend clarity, and a "final" map prepared. Since all concepts are in some way related to one another, it is necessary to be selective in identifying cross-links, and to be as precise as possible in identifying linking words that connect concepts. It is very important to note that sentences, from which entire subsections of a map can be created, should never be used in the construction of a concept map. This is as illustrated in the following figure 13.4.

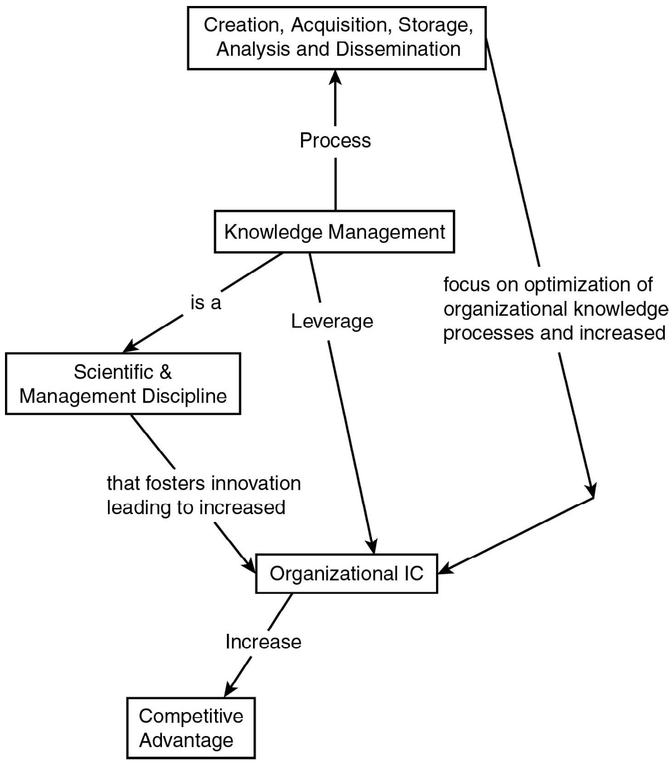


Fig. 13.4 *Incorrect Concept Map*

Usage

Concept mapping is an easy way to achieve very high levels of cognitive performance, when the process is done well. This is one reason why concept mapping can be a very powerful evaluation tool.

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Instructional design: Concept maps can be enormously useful in instructional design. They present in a highly concise manner the key concepts and principles that are fundamental to the topic being taught. The hierarchical organization of concept maps is very helpful in achieving a highly optimal sequencing of instructional material. In order to achieve meaningful learning, new knowledge needs to be integrated with a learner's prior or residual knowledge and propositional frameworks. There needs to be a gradual progression from the more general and inclusive concepts to the more specific information in order to enhance meaningful learning. The instructional design process should commence with the construction of a global map at a macro level showing the major ideas that are to be presented in the whole course, or in a whole curriculum, followed by more specific maps or micro maps to depict the knowledge structure for a very specific segment of the instructional program.

Example

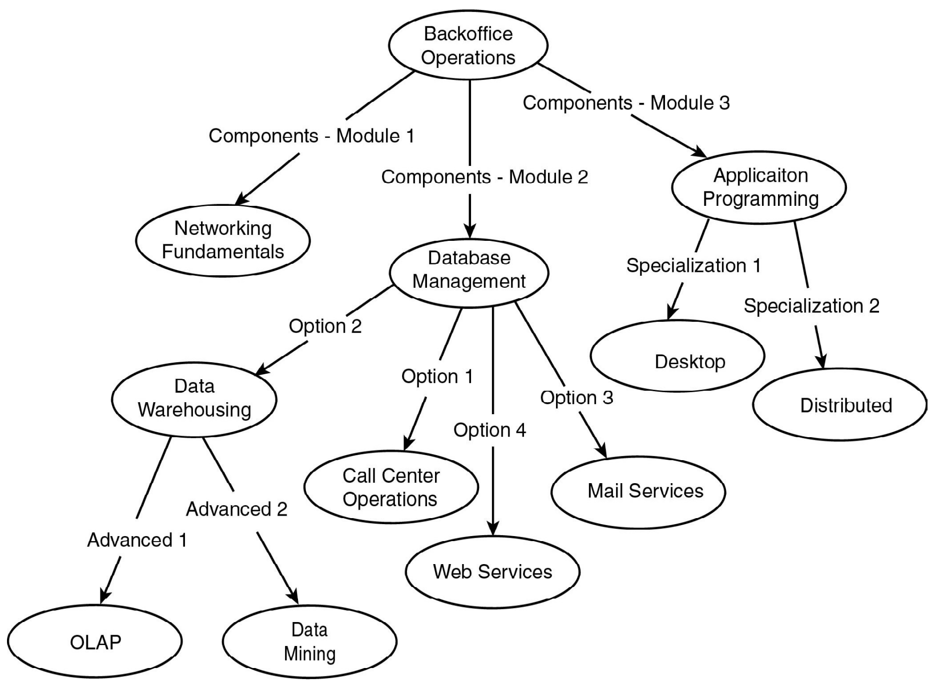


Fig. 13.5 *Concept Maps in Instructional Design*

The usage of concept maps in instructional design helps to make the instructional mechanism conceptually transparent to the intended participants. Concept map can greatly reduce the learning curve of most participants and would be highly helpful in learning areas of science and engineering. The construction of relevant concept maps can be a highly helpful tool for participants with average or below average learning levels. An example is as illustrated in the Figure 13.5.

Organizational cooperative learning: Considerable amount of research in the area of learning and development of learning methodologies have proven

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beyond doubt that, positive and highly effective learning occurs when individuals work in small groups and cooperate to learn. In most cases and contexts, the usage of or the development of concept maps have speeded up the process to a considerable extent. Concept maps are now beginning to be used in corporations to help teams clarify and articulate the knowledge needed to solve problems ranging from the design of new products to marketing to administrative problem resolution.

Concept maps for evaluation Concept mapping is being increasingly employed in educational institutions as well as educational material to summarize understandings acquired by participants after the completion of a unit, chapter, module or semester. They can be also employed in organizations to evaluate the learning levels at the end of a training session or a workshop as well as evaluate the on-the-job skills of employees.

Concept mapping tools

Inspiration: Inspiration is currently one of the most popular computer software programs for creating concept maps. Organization of concepts, and brainstorming and mapping of ideas are some of the primary functions of this program. The graphical capabilities of Inspiration makes it a useful program for creating graphs for various purposes. Nodes may be shown in many different useful preset and user-defined shapes. Links may be straight or curved and may be labeled. Arrowheads may be placed on any side, and everything may be set to any color. This helps in effective construction and presentation of maps.

Check Your Progress

5. How does collaborative computing technologies help organizations?
6. Define Knowledge Management System (KMS).
7. List the five KM categories of the KMS software.
8. How does an organizational knowledge network is constructed?
9. What is construct-relation space?

13.5 KNOWLEDGE MANAGEMENT STRATEGIES FOR DIFFERENT ORGANIZATIONS

The commonly employed strategy is to design and develop systems and practices to obtain, organize, restructure, warehouse or memorize and distribute knowledge. This strategy enables organizations to dramatically reduce cycle time and costs, increase sales and effectively bring the knowledge of the organization to bear on customer needs. An approach, based on this strategy, results in improvement in operations or to develop and deliver products and services tailored to the market

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requirements. Building of teams, relationships and networks forms the basis for effective transfer, besides approaches of encouraging collaborative knowledge transfer. Many organizations especially those in the service industry adopt a strategy with a strong focus on their customer. This customer-focused knowledge strategy is directed towards capturing, developing and transferring knowledge and understanding of customers' diverse needs, preferences, and businesses. These efforts bring about a significant improvement in sales and use the collective knowledge of the organization to solve customer problems. This strategy recognizes and facilitates learning from customers and understand their needs better and development of effective solutions to take them.

By establishing personal responsibility for knowledge, organizations are recognizing that individuals must be supported and made accountable for identifying, maintaining, and expanding their own knowledge as well as renewing and sharing their knowledge assets. Companies are now realizing the value of each knowledgeable and capable employee and recognize the key fact that the development of their skills lay with employee themselves and not with the organization. Some firms are building incentives into their appraisal system and offering other motivators to encourage the development of a knowledge-intensive culture.

Another important strategy revolves around leveraging assets such as patents, technologies, operational and management practices, customer relations, organizational arrangements, and other structural knowledge assets and concentrates on renewing, organizing, valuing, safekeeping, increasing availability of, and marketing these assets.

The final strategy, innovation and knowledge creation emphasizes the creation of new knowledge through basic and applied research and development. Organizations adopting these strategies need to ascend the knowledge spiral and continually discover new and better ways of functioning and innovating. They recognize that innovation is central to growth and that unique knowledge and expertise enhances their competitive value in the marketplace.

Organizational Knowledge Management Components and Functions

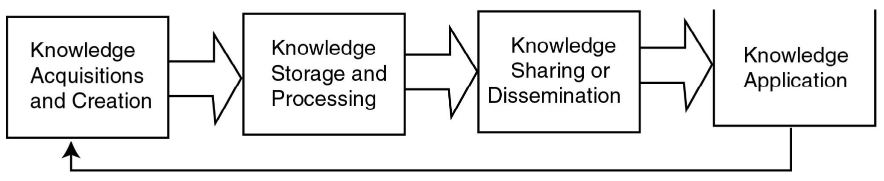


Fig. 13.6 *Knowledge Management Process*

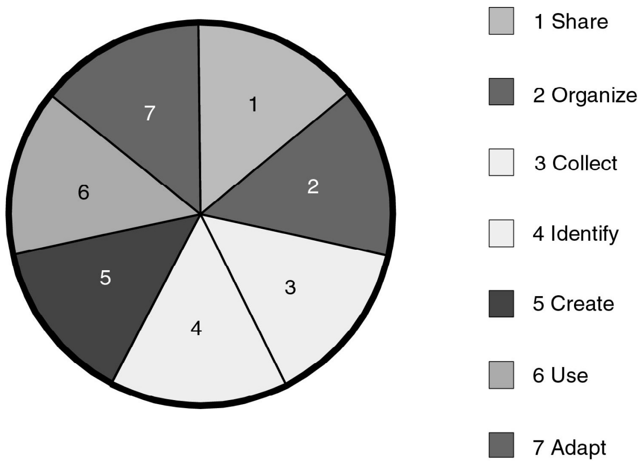


Fig. 13.7 *Organizational Knowledge Management Processes*

KM is a conscious strategy of getting the right knowledge, to the right people, at the right time, and helping people share and put information into action in ways that will improve organizational performance. KM is a complex process that must be supported by a strong foundation of enablers. The enablers for KM are strategy, leadership, culture, measurement and technology. Each of these must be designed and managed in alignment with others in support of the process. As illustrated in the Figures 13.6 and 13.7 above the process usually involves several of the following stages or sub processes in the use of knowledge and are as listed below:

1. Knowledge Creation
2. Knowledge Identification
3. Knowledge Collection
4. Knowledge Organization
5. Knowledge Sharing
6. Knowledge Adaption
7. Knowledge Usage

KM is a discipline that promotes an integrated approach to identifying, capturing, evaluating, retrieving and sharing all of an enterprise's information assets. Bill Gates, defines KM as "...nothing more than managing information flow, getting the right information to the people who need it so that they can act on it quickly". The vision of an organization coupled with the knowledge processes and the technology, which acts as an enabler form the three key components of a KM system. These three elements have to be in place before any knowledge-based

activity can be initiated within any organization. The concept is as illustrated in the Figure 13.8 below.

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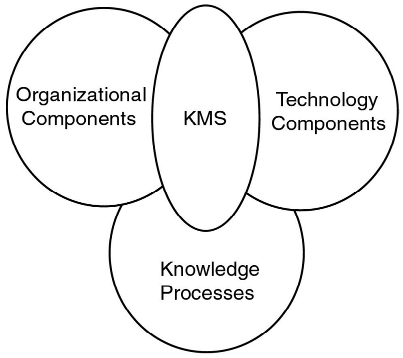


Fig. 13.8 *KM Components*

The most crucial function is to build an enterprise-wide knowledge repository that holds validated and compiled knowledge using the process of knowledge discovery, knowledge embedding and knowledge transformation. This has to be supplemented by techniques that facilitate the effective dissemination of knowledge within the organization. The key KM functions are as summarized below:

i. Building, renewal and organization of knowledge assets
   a. Knowledge creation and sourcing
   b. Knowledge compilation and sourcing
ii. Effective distribution and application of knowledge assets
   a. Knowledge dissemination
   b. Knowledge application and value realization

13.6 KNOWLEDGE MANAGEMENT IN RESEARCH AND DEVELOPMENT ORGANIZATIONS

Companies typically invest in research and development (R&D) as a means of enhancing the knowledge management, and then employ other strategic tools to create associations of a product's uniqueness among the competition.

However, improvements in knowledge management have accelerated the diffusion of competitive intelligence in the marketplace to the point where companies are no longer assured that they will achieve sustainable competitive advantages from their R&D efforts. As an example, any breakthrough made by a personal computer company in terms of physical product attributes will be quickly imitated by competitors in today's marketplace. In essence, then, any point of physical differentiation for a company will soon become commoditized as competitors add similar features to their offerings, undermining the company's ability to build long-term competitive advantages in the market.

Knowledge management has to be performed with team work of experts and researchers for various basic sciences and suitable management of the research and development setting.

Research and development activities can be said to be a generic concept but they pertain to two products which are knowledge and technology. Here the role of research and development activities for generating new technology is crucial.

Knowledge management could be said to be the master key of development and is thus the most powerful factor when it comes to the economic revolution in societies. This could also be done with R and D.

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Check Your Progress

10. Why does organizations adopt knowledge management strategies?
11. Why companies invest in research and development (R&D)?

13.7 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. The three major and interrelated driving forces that have resulted in the changing business rules and have been contributory to the increased competitiveness are: globalization, information/ knowledge intensity, and internetworking and connectivity.
2. Knowledge assets refers to the knowledge regarding markets, products, technologies and organizations, that a business owns or needs to own and which enable its business processes to generate profits, add value, etc.
3. Knowledge management or KM manages the processes that act upon the assets, such as preserving knowledge; using knowledge and sharing knowledge.
4. The four commonly employed knowledge management approaches are as follows:
   - (a) Repository model approach
   - (b) Communities of practice (COP) approach
   - (c) Continuous learning approach
   - (d) Business intelligence approach
5. Collaborative computing technologies help organizations in many ways such as it improves workforce productivity. Besides, it will also enhance the creativity of an individual worker as it necessitates employees to access each other's information whenever they need it for work.

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6. A Knowledge Management System [KMS] can be described as, '*A system for managing, organizing, filtering, analyzing, and disseminating knowledge in all of its forms within an organization.*'
7. The KMS software can be classified into the five KM categories, such as:
   (a) Knowledge gathering
   (b) Knowledge storage
   (c) Knowledge communication
   (d) Knowledge dissemination
   (e) Knowledge synthesis
8. A knowledge ecosystem can be constructed as a tri-layed network comprising of the following:
   (a) People network
   (b) Knowledge network
   (c) Technology network
9. The construct-relation space represents the area where each of the constructs developed in the dialogue space is formally defined, described and whose key characteristics are listed based on the described relationship.
10. Organizations are adopting knowledge management strategies need to ascend the knowledge spiral and continually discover new and better ways of functioning and innovating. They recognize that innovation is central to growth and that unique knowledge and expertise enhances their competitive value in the marketplace.
11. Companies typically invest in research and development (R&D) as a means of enhancing the knowledge management, and then employ other strategic tools to create associations of a product's uniqueness among the competition.

13.8 SUMMARY

- KM initiatives are on an upswing as managers at all levels within all organizations face mounting pressure to work smarter and faster while wrestling with the demands of advanced technology and a shrinking work force.
- Various management experts have for several years highlighted the role of knowledge or IC in business and the need to leverage them to bring about tangible organizational benefits. The value of high-tech companies such as software and biotechnology companies lies not in physical assets that is measured by conventional accountancy techniques, but in their intangibles such as knowledge and patents.

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- The evolving knowledge economy has important implications for policy makers of local, regional and national government as well as international agencies and institutions.
- Most businesses enterprises are now realizing the role of knowledge and are creating KM programs and appointing Chief Knowledge Officers (CKO).
- Knowledge assets refers to the knowledge regarding markets, products, technologies and organizations, that a business owns or needs to own and which enable its business processes to generate profits, add value, etc. KM, is not only about managing these knowledge assets, but also managing the processes that act upon the assets. These processes include: developing knowledge; preserving knowledge; using knowledge, and sharing knowledge.
- KM structures tend to possess a decentralized management responsibility along with a shared infrastructure that is necessary to support it. The infrastructure includes a knowledge visionary who helps to develop the shared vision, coordinates activities and encourages KM efforts in conjunction with an organizational information technology platform and corporate storage repositories such as databases and libraries.
- Technology forms one of the key enablers for the implementation of KM services and applications. Many of the commonly available approaches to KM would be rendered ineffective in the absence of technology.
- Collaborative computing could be seen to be a diverse collection of information technologies. The same has been designed to support work among individuals. It is true that Organizations which make use of the collaborative computing technologies will improve workforce productivity .They will also enhance the creativity of an individual worker.
- A Knowledge Management System [KMS] can be described as, *"A system for managing, organizing, filtering, analyzing, and disseminating knowledge in all of its forms within an organization."* It supports organizational functions while addressing the needs of the individual within a purposeful context (departments or divisions).
- The key organizational knowledge processes described in the previous chapter are based on my experiences, insights and research in this field.
- Organizational knowledge is created through the personal as well as collective knowledge creation cycles, as described in the preceding chapter.
- Knowledge ecosystem can be construed as a tri-layered network comprising of the following: people network, knowledge network, and technology network.

- Knowledge mapping represents the ongoing quest within an organization (including its supply and customer chain) to help discover the location, ownership, value and use of knowledge artifacts, to learn the roles and expertise of people, to identify constraints to the flow of knowledge, and to highlight opportunities to leverage existing knowledge.
- The commonly employed strategy is to design and develop systems and practices to obtain, organize, restructure, warehouse or memorize and distribute knowledge. This strategy enables organizations to dramatically reduce cycle time and costs, increase sales and effectively bring the knowledge of the organization to bear on customer needs.
- KM is a conscious strategy of getting the right knowledge, to the right people, at the right time, and helping people share and put information into action in ways that will improve organizational performance.
- The most crucial function is to build an enterprise-wide knowledge repository that holds validated and compiled knowledge using the process of knowledge discovery, knowledge embedding and knowledge transformation.
- Companies typically invest in research and development (R&D) as a means of enhancing the knowledge management, and then employ other strategic tools to create associations of a product's uniqueness among the competition.
- Research and development activities can be said to be a generic concept but they pertain to two products which are knowledge and technology. Here the role of research and development activities for generating new technology is crucial.

13.9 KEY WORDS

- **Knowledge management:** It refers to a process of creating, sharing, using and managing the knowledge and information of an organisation.
- **Business intelligence:** It comprise of the strategies and technologies used by enterprises for the data analysis of business information.
- **Knowledge ecosystem:** It refers to an approach to knowledge management which claims to foster the dynamic evolution of knowledge interactions between entities to improve decision-making and innovation through improved evolutionary networks of collaboration.
- **Knowledge map:** It refers to a visual aid that shows where knowledge can be found within a group or organization, and how to find those with the most expertise.

13.10 SELF ASSESSMENT QUESTIONS AND EXERCISES

NOTES

Short Answer Questions

1. How is knowledge economy different from the traditional economy?
2. What important factors should be considered while creating KM programs to businesses?
3. List the four basic objectives of KM initiatives within an organization.
4. What are the five common categories of KM Software that represent the current software market?
5. Write a note on organizational network analysis (ONA).
6. What are organizational knowledge mapping techniques?
7. What is concept mapping?
8. Summarize the key functions of knowledge management.

Long Answer Questions

1. What is knowledge management and why is it important? Discuss.
2. Discuss the organizational knowledge management approaches in detail.
3. Explain the working of organizational knowledge creation.
4. Describe knowledge map creation with the help of example.
5. What is the role of knowledge management in research and development organizations? Explain.

13.11 FURTHER READINGS

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UNIT 14 IMPLEMENTATION OF E-COMMERCE

NOTES

Structure

14.0 INTRODUCTION

Now, that you are clear with the basics of e-commerce business, let us learn about the successful implementation of an e-commerce business. As you know, an e-commerce website of your business enables to sell the products online, reach more and more customers, target an ideal market, and build a closer relationship with the customers by improving their purchasing experience. A successful e-commerce requires a sophisticated content management system and a highly developed strategy that comprises of various separate elements. Some of the essentialities of e-commerce include dedicated purchase, support systems, payment and customer relationship management procedure.

In this unit, you will study in detail about the implementation of e-commerce through the functionalities and growth of eBay and working of B2C websites. The unit goes on to discuss about an advanced online payment gateway namely PayPal, bidding process and also about the process of NEFT, a nation-wide payment system.

14.1 OBJECTIVES

After going through this unit, you will be able to:

- Describe the essentialities of the implementation of e-commerce
- Understand the operations and growth of eBay

- Analyse the working mechanism of PayPal
- Explain the concept and benefits of B2C e-commerce
- Assess an 'National Electronic Fund Transfer (NEFT)'

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14.2 EBAY: LEADING E-COMMERCE GIANT

E-commerce is a platform where when a customer opens a website to purchase a product, the seller buyer interface gets complete information. Websites like E-bay are an excellent example of bringing buyers and sellers of various product categories together. Ebay is an American multinational e-commerce corporation that simplifies consumer-to-consumer and business-to-consumer sales through its e-commerce website.

The firm has to keep the online customer involved with the company through routine mailers telling about the new products. This will not only extend a good relation with the online customer but also help propagate new products to them to try and analyse what is their delight need and try to fulfill it through information from the online e-commerce system.

E-marketing helps companies better understand existing online customers' needs and behaviors and enhance the profitability from existing online customers by cross-selling. They can then customize their products and services in accordance with the needs and preferences of online customer as reflected by the system.

E-commerce with online customer is a highly evolved and valuable conversation, but it has to be constant between the seller and the online customer, and the company needs to take a regular feedback for customer satisfaction. Getting customer feedback through an e-commerce website is easier as compared to other mediums. e-commerce helps discover, manage, and listen to online customer. It is also a good way to retain the old customers and attract new customers. E-commerce helps discover, manage, and listen to online customer.

14.2.1 Registration, Time factor and Bidding Process

There are a few important things you need to know when you buy something on eBay. It is important to research before you selecting the **Place bid** button.

- End of the auction timing
- Seller details
- Product details

eBay is a one-stop destination for the buyers you scout for buying some cool stuffs at amazing prizes, but a complete knowledge and familiarity with the e-commerce site is necessary before placing an order.

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If you describe the item incorrectly, buyers may be doubtful of bidding. Even worse, buyers could decide not to bid on any of your future items if they are under the impression that you don't know what you are selling. The more correct information you have and use, the more credible you'll become in the buyers' eyes.

You can feed a bidding frenzy on your item by using a low opening bid price and no reserve, which should attract more bidders at the outset. The more people bidding on your listing, the more likely that two or more of them will get drawn into a personal bidding war. At that point, winning the item becomes almost as important as the product they want to buy, and these bidders might eventually pay more than they intended to pay to beat out the competition. This can lead to you getting much more for your product than you have expected.

14.2.2 Growth of eBay

eBay is the online auction service which is used to buy and sell items. The e-commerce company uses an electronic platform to expedite and ease millions of transactions every day. The users on the lookout to purchase items were asked to make bids over a particular time period and then the seller determines guidelines like minimum bid he or she is willing to accept. Generally, the payment is made electronically through PayPal and then the products are shipped to the buyer.

eBay had its first sale in 1995. The company had a phenomenal growth in the January 1997 the site hosted 2,000,000 auctions, compared with 250,000 during the whole of 1996. The company was one of the visionary leaders bringing people into the realm of e-commerce. The company on the success of e-commerce also started many different subsidiary companies.

Many a companies like eBay today consider change from the traditional models to the new ones. A business model for online stores which has been explained here is just a defining a way of doing business with the online parameter in it. Thus the business model is directly related to the revenue of the company. In an e-business model it is very important to know the value chain one is talking about. Also important in this context is the study of company's strategy. Another aspect which is being studied is the consumer perception of online marketing and the crucial issues of the same

Points-of-difference (PODs) – It refers to the attributes or benefits consumers strongly associate with a brand, positively evaluate and believe they could not find to the same extent with a competing brand i.e. points where you are claiming superiority or exclusiveness over other products in the category.

Points-of-parity (POPs) – It refers to the aspects of the product that are not necessarily unique to the brand but may be shared by other brands i.e. where you can at least match the competitors claimed benefits.

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Whilst when assessing the deliverability criteria for POPs, we will look at their:

- Feasibility
- Communicability
- Sustainability

There are three types of difference: brand performance associations; brand imagery associations; and consumer insight associations. Insight alone is a weak point of difference, easily copied. Putting these together helps checking their desirability, deliverability and eliminates contradictions.

Traditionally, the people responsible for positioning brands have concentrated on the differences that set each brand apart from the competition. But emphasizing differences isn't enough to sustain a brand against competitors. Here we consider the frame of reference within which the brand works and the features the brand shares with other products.

Also there is a variable cost related to the campaign bidding with various advertising platforms. The variable costs will also include the costs which have to be paid to the affiliates for hosting the company's ads on their websites and the payment made to blogs for the same in a campaign.

By understanding what customers want, how they choose, and what motivates them, we can identify opportunities for profitable differentiation. Differentiation extends beyond the physical characteristics of the product or service to encompass everything about the product or service that influences the value customers derive from it.

This means that differentiation includes every aspect of the way in which a company relates to its customers. The differentiation to the products could be done in flavours which could suit the taste buds of the key customers.

In analysing differentiation opportunities, we can distinguish *tangible* and *intangible* dimensions of differentiation. Tangible differentiation is concerned with the observable characteristics of a product or service that are relevant to customers' preferences and choice processes. These include size, shape, colour, weight, design, material, and technology. Tangible differentiation also includes the performance of the product or service in terms of reliability, consistency, taste, speed, durability, and safety.

Tangible differentiation extends to products and services that complement the product in question. Opportunities for intangible differentiation arise because the value that customers perceive in a product or service does not depend exclusively on the tangible aspects of the offering.

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There are few products where customer choice is determined solely by observable product features or objective performance criteria.

Check Your Progress

1. How does an e-commerce website help your business?
2. What is eBay known for?
3. What is point-of-difference?
4. What do you understand by point-of-parity?

14.3 BUSINESS-TO-CONSUMER (B2C) APPROACH

The business to consumer approach clearly concentrates on individual buyers and is thus known as Business-to-Consumer (B2C) model. The B2C model offers consumers the capabilities to browse, select and merchandise online from a wider variety of sellers and at better prices. eBay deals in both B2C and C2C marketplace as it markets goods directly to customers and also allows users to sell goods themselves.

The B2C e-commerce interaction is most appropriate for the following types of transactions:

(i) Easily transformable goods, i.e., products that are easily transformable into digital format, such as videos, software packages, music books, and so on

(ii) Highly rated branded items or items with return security

(iii) Items sold in packets that are not possible to open in physical stores

(iv) Items that follow standard specification

The following steps summarizes the working of B2C:

(i) The customer identifies his/her need.

(ii) Then, the customer looks for the product or service that suit his/her needs.

(iii) The customer selects a vendor and negotiates a price.

(iv) The customer then receives the product or service.

(v) The customer makes the payment for the received product service.

(vi) The customer gets the services and warranty claims that are associated with the product.

14.4 PAYPAL –NEW TREND IN MAKING PAYMENTS ONLINE

NOTES

PayPal, which operated as a subsidiary of eBay from 2002 till 2014 provides several online payment and money transfer options for consumers and other companies. PayPal is considered as a new trend in making payments online as it functions as an electronic alternative to traditional paper methods like cheques and money orders. Many online vendors, auction sites and commercial users use PayPal as a payment processor. Though, the money transfer is charged with some amount in exchange for benefits such as one-click transactions and password memory.

eBay has many items for sale and in a move to sell these items it introduced a safe money transfer service which was called PayPal. This payment system allows buyers to send money to sellers virtually, without involving personal checking, debit card, or credit card numbers. Paypal is safe, widely accepted, and seamless when paying for items online.

PayPal is a service that enables you to pay, send money, and accept payments. Register your credit card or debit card with your PayPal account. You can pay by simply choosing PayPal at checkout, logging into your PayPal account, and confirming your payment. We complete the process for you. Simply choose PayPal when you select a payment option on this site, and you can quickly open a PayPal account and add your payment method to complete your purchase. You can use your PayPal account to shop with millions of merchants and sellers around the globe wherever you see the PayPal logo.

As a PayPal member, you are able to:

- Transfer money from your bank account to your PayPal account
- Get a cash advance from your credit card and deposit the amount in your PayPal account
- Transfer money from your own PayPal account to another member's PayPal account
- Transfer money from your PayPal account to your checking or savings account
- Have a check mailed to you for the balance of your PayPal account
- Get a PayPal debit card that you can use to make real-world purchases from your PayPal account

The process will work like this:

1. **Buyer Wins an Auction or Makes a Purchase.** A bidder makes a purchase from a seller that accepts PayPal as a payment method.

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2. **Winning Bidder Checks Out Using PayPal.** From the My eBay page or on the item listing itself, the winning bidder, who is a member of PayPal, clicks on the "Pay Now" icon next to the completed listing.
3. **Money Is Moved Automatically.** By checking out using PayPal, the winning buyer automatically triggers a transfer of funds from their preferred payment method (either credit card or bank account) into his or her PayPal account. These funds are then immediately transferred to the seller's PayPal account. Or, as a Paypal member, you can leave a balance in your account to cover future purchases.

With the funds now in their account, the seller is now free to either transfer them to his or her bank account(s), have a check mailed from PayPal, spend the money in the 'real' world using a PayPal debit card, or use the PayPal balance to make other purchases online.

14.5 NATIONAL ELECTRONIC FUNDS TRANSFER (NEFT)

We have discussed this topic in Unit 9. Let's recapitulate the idea here. NEFT is an electronic funds transfer system maintained by the Reserve Bank of India (RBI). Started in November 2005, the setup was established and maintained by Institute for Development and Research in Banking Technology (IDRBT). NEFT is a facility enabling bank customers in India to transfer funds between any two NEFT-enabled bank accounts on a one-to-one basis. It is done via electronic messages. Unlike Real-time gross settlement (RTGS), fund transfers through the NEFT system do not occur in real-time basis. NEFT settles fund transfers in half-hourly batches with 23 settlements occurring between 8:00 AM and 7:00 PM on week days and the 1st, 3rd and 5th Saturday of the calendar month. Transfers initiated outside this time period are settled at the next available window. No settlements are made on the second and fourth Saturday of the month, or on Sundays, or on public holidays.

NEFT facilities are available at 74,680 branches offices of 101 banks across the country (out of around 82,400 bank branches) as of January 2011, and well as online through the website of NEFT-enabled banks and work on a batch mode. NEFT has gained popularity due to its saving on time and the ease.

Check Your Progress

5. What is B2C approach and what does it offer?
6. Why PayPal is considered as a new trend of making online payments?
7. What is the difference between NEFT and RTGS transactions?

14.6 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

NOTES

1. An e-commerce website of your business enables to sell the products online, reach more and more customers, target an ideal market, and build a closer relationship with the customers by improving their purchasing experience.
2. eBay is an American multinational e-commerce corporation and it is widely known for providing the online auction service which is used to buy and sell items.
3. Point-of-difference refers to the attributes or benefits consumers strongly associate with a brand, positively evaluate and believe they could not find to the same extent with a competing brand i.e. points where you are claiming superiority or exclusiveness over other products in the category.
4. Point-of-parity refers to the aspects of the product that are not necessarily unique to the brand but may be shared by other brands i.e. where you can at least match the competitors claimed benefits.
5. The business to consumer approach clearly concentrates on individual buyers and is thus known as Business-to-Consumer (B2C) model. It offers consumers the capabilities to browse, select and merchandise online from a wider variety of sellers and at better prices.
6. PayPal is considered as a new trend of making online payments as it functions as an electronic alternative to traditional paper methods like cheques and money orders. Many online vendors, auction sites and commercial users use PayPal as a payment processor.
7. Fund transfers through the NEFT system do not occur in real-time basis. While in real-time gross settlement (RTGS), the fund transfers occur in real-time basis.

14.7 SUMMARY

- E-commerce is a platform where when a customer opens a website to purchase a product, the seller buyer interface gets complete information. Websites like E-bay are an excellent example of bringing buyers and sellers of various product categories together.
- ebay is an American multinational e-commerce corporation that simplifies consumer-to-consumer and business-to-consumer sales through its e-commerce website.
- E-marketing helps companies better understand existing online customers' needs and behaviors and enhance the profitability from existing online customers by cross-selling.

NOTES

- eBay is a one-stop destination for the buyers you scout for buying some cool stuffs at amazing prizes, but a complete knowledge and familiarity with the e-commerce site is necessary before placing an order.
- eBay is the online auction service which is used to buy and sell items. The e-commerce company uses an electronic platform to expedite and ease millions of transactions every day.
- Differentiation extends beyond the physical characteristics of the product or service to encompass everything about the product or service that influences the value customers derive from it.
- In analysing differentiation opportunities, we can distinguish *tangible* and *intangible* dimensions of differentiation. Tangible differentiation is concerned with the observable characteristics of a product or service that are relevant to customers' preferences and choice processes. These include size, shape, colour, weight, design, material, and technology. Tangible differentiation also includes the performance of the product or service in terms of reliability, consistency, taste, speed, durability, and safety.
- The business to consumer model clearly concentrates on individual buyers and is thus known as Business-to-Consumer (B2C) model. The B2C model offers consumers the capabilities to browse, select and merchandise online from a wider variety of sellers and at better prices. eBay deals in both B2C and C2C marketplace as it markets goods directly to customers and also allows users to sell goods themselves.
- PayPal, which operated as a subsidiary of eBay (from 2002-2014) provides several online payment and money transfer options for consumers and other companies. PayPal is considered as a new trend in making payments online as it functions as an electronic alternative to traditional paper methods like cheque and money orders.
- PayPal is a service that enables you to pay, send money, and accept payments. Register your credit card or debit card with your PayPal account.
- National Electronic Funds Transfer (NEFT) is an electronic funds transfer system maintained by the Reserve Bank of India (RBI). Started in November 2005, the setup was established and maintained by Institute for Development and Research in Banking Technology (IDRBT).
- NEFT is a facility enabling bank customers in India to transfer funds between any two NEFT-enabled bank accounts on a one-to-one basis. It is done via electronic messages. Unlike Real-time gross settlement (RTGS), fund transfers through the NEFT system do not occur in real-time basis.

- NEFT facilities are available at 74,680 branches offices of 101 banks across the country (out of around 82,400 bank branches) as of January 2011, and well as online through the website of NEFT-enabled banks and work on a batch mode.

NOTES

14.8 KEY WORDS

- **PayPal:** It refers to an electronic commerce (e-commerce) company that facilitates payments between parties through online funds transfers.
- **Real-time gross settlement (RTGS):** It refers to a funds transfer system where the transfer of money or securities takes place from one bank to any other bank on a 'real time' and on a 'gross' basis.
- **National Electronic Funds Transfer (NEFT):** It refers to an Indian system of electronic transfer of money from one bank or bank branch to another.

14.9 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short-Answer Questions

1. What do you mean by e-commerce?
2. What factors should be considered while assessing the deliverability criteria for POPs?
3. Briefly explain *tangible* and *intangible* dimensions of differentiation.
4. List the types of transactions which are best suited for B2C e-commerce interaction.
5. What are the benefits of being a PayPal member?
6. Give an overview of a few characteristics of NEFT.

Long-Answer Questions

1. Discuss the growth of eBay.
2. Describe the working of B2C.
3. Explain the operational process of PayPal.
4. How the funds are transferred through NEFT? Explain.

NOTES

14.10 FURTHER READINGS

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